CHEMICAL & METALLURGICAL ENGINEERING

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CHEMICAL & METALLURGICAL ENGINEERING

A consolidation of
ELECTROCHEMICAL & METALLURGICAL INDUSTRY *and* IRON & STEEL MAGAZINE

H. C. PARMELEE, Editor

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Chemical & Metallurgical Engineering

is the successor to *Metallurgical and Chemical Engineering*, which, in turn, was a consolidation of *Electrochemical and Metallurgical Industry* and *Iron and Steel Magazine* effected in July, 1906.

The magazine was originally founded as *Electrochemical Industry*, in September, 1902, and was published monthly under the editorial direction of Dr. E. F. Roeber. It continued under that title until January, 1905, when it was changed to *Electrochemical and Metallurgical Industry*. In July, 1906, the consolidation was made with *Iron and Steel Magazine*, that had been founded 8 years previously by Dr. Albert Sauveur. In January, 1910, the title was changed to *Metallurgical and Chemical Engineering*, and semi-monthly publication was begun Sept. 1, 1915. On July 1, 1918, the title was changed to *Chemical and Metallurgical Engineering*, and weekly publication was begun Oct. 1, 1919.

Dr. E. F. Roeber was editor of the paper from the time it was founded until his death on Oct. 17, 1917. After a brief interim he was succeeded by H. C. Parmelee.

The Staff of *Chemical & Metallurgical Engineering* comprises: H. C. Parmelee, editor; Ellwood Hendrick, consulting editor; A. W. Allen, Henry M. Batters, Charles N. Hulburt, Sidney D. Kirkpatrick, R. S. McBride, Graham L. Montgomery, Charles Wadsworth, 3rd, Hans H. Wanders and Alan G. Wikoff, assistant editors, and Harold J. Payne, editorial assistant.

The Slide Rule And the Golden Rule

A GREAT DEAL of talk is heard these days of the necessity of working out sales effort along scientific lines. Analysis of the prospect must go with analysis of the product, and the sales campaign must be the result of research—scientifically carried out. Today's goal of distribution is to put the goods where they are available at the time that the consumer can be induced to purchase. This means a keen and intelligent study of all the conditions which may affect the sale of an article, followed up by good judgment in applying the results of this study.

In all this talk, however, note how little we hear of the consumer's side of the question. The latest psychological knowledge may be applied to create a demand for a product, and in the last analysis the consumer might have been better off if he had never purchased it. We all have had the experience of buying an article of inferior quality which had to be replaced at far too early a date. This purchase would probably never have been made except for the fact that the sales campaign carried on in connection with the article had created a desire for it which took no account of quality.

But selling carried on along these lines must have a detrimental effect on business in the long run. To our way of thinking the sales saturation point can never be reached for quality goods, but forcing the market for poor goods results in overcautious consumers and poor business for all. When you plan your next sales and production schedules, give the golden rule a place beside the slide rule and see if it isn't the better policy after all.

Chemical Engineering Enters the Useful Arts

AT THE risk of being considered boresome, we venture to recall again the incident of the young graduate chemical engineer who asked aid in obtaining a position in a chemical plant near his home town. No opening being available, it was suggested that he try a large bakery in the town instead. His exclamation "But they don't want a chemical engineer!" was met with the reply: "That is what gives you your chance, if they knew they needed one they would get a man of experience; they wouldn't take you. But if you can get a job of any sort there you can find all sorts of opportunities to apply chemistry and make yourself a man of great value to them. They need a chemical engineer, but don't know it. You can take almost any job in the bakery and teach them what they need to know—if you have tact. And if you have patience along with tact, they will probably pay you well for your services."

Our reason for this repetition is that the present issue contains an almost ideal illustration of what has already been accomplished along the lines suggested. It should not be assumed, however, that this plant is the only example, as the more progressive bakers throughout the country are working along similar lines. Nor has this development sprung up mushroom-like over night and we hasten to emphasize this point lest it should appear that we are seeking credit for having called attention to the opportunities in this field. It has required years of patient, tactful endeavor to convert the ancient art of baking into a chemical engineering industry.

And as many of our largest industries are still arts, it may not be out of place to counsel the young graduate chemical engineer who contemplates entering any of these to consider carefully the reply quoted above; for it contains advice essential to success. To enter one of these industries with a superior attitude and a conviction that you are going to revolutionize it forthwith is to invite almost certain failure. If you will but consider what the practical man has been able to accomplish without the guiding light of fundamental

principles, you will marvel and respect rather than ridicule his methods. Until you have mastered the industry as an art it will be difficult to make really valuable and lasting improvements. It is a matter of years rather than of weeks or even months, and much patience will be required on the part of both employer and employee, but the goal is worth striving for.

By way of illustration there is the case of a young technical man who went to work for a well-known leather manufacturer with the express understanding on the part of the employer that the young man would not be able to tell him how to make leather—he knew that already—but that long and careful study might bring to light fundamental principles which would give more positive control over manufacturing operations. It did take several years, but the technical man is now in charge of production and no one familiar with the plant in question will deny the value of the experiment. With such vision on the part of executives and a spirit of patient co-operation on the part of young chemical engineers, the useful arts would soon assume a prominent position in the group of chemical engineering industries.

Public and Private Aspects of Business

TWO conspicuous developments of the past few weeks have given the country a real working basis for determining the limit of public control of private industry. The Supreme Court in its decision of June 11 on a ruling of the Kansas Court of Industrial Relations makes it perfectly clear that the question of whether or not a business involves essentially public interest is a matter of fact to be determined by the court, not a matter of opinion to be settled by legislation. And President Harding, speaking in Kansas City on June 22, was equally decisive in his stand that the public interest in transportation must be conserved without governmental ownership or operation. These views should be most heartening to business.

So-called "progressive leaders," who in reality are but radicals under another name, have been prone to assume that a mere declaration by a state legislature or by Congress would be sufficient to place an industry under governmental control. It is obvious that a continuation of such a policy would be fatal to American business independence. Like death and the taxes, which are always with us, we have permanently established under the American system of government a recognition of the superior rights of the public as above the rights of any individual, corporation or industry. But this right of the public must be clearly defined and unmistakably evident before our government grants to any legislator or public official the right to interfere with business under the guise of serving the public welfare. Should the degree of public interest in any particular industry or branch of trade be at all questionable, its determination must rest with the court.

In Kansas City, that stronghold of railroad opposition, situated in a district that has suffered sorely because of the insufficiencies of transportation, President Harding chose to outline his stand on this important national problem. Throughout his entire address he advocated every measure that would protect the public's interest, but there was no threat of government ownership and control. Regulations, of increasing severity, if necessary; consolidations and centralized control of certain smaller, isolated lines; and the coordination of all forms of transportation, whether by rail, water or highway, were important factors in the President's program. At no time, however, did he have anything but approbation for the policy of private ownership and operation of the railroads.

Well-ordered, honest business, though annoyed by regulation, has a paramount interest in the public welfare and will never willingly combat a reasonable expression of that interest. In this attitude our industries may be encouraged by observing that those responsible for the conduct and policies of our government clearly recognize the reciprocal obligation of promoting the purely private aspects of business.

Dipping Into Chemistry

A PROFESSOR at Columbia has sent us a clipping from the Yonkers *Star* which announces under "Household Hints" that "A freshly whitewashed ceiling will give butter a strong taste." Our friend passed the information around among his colleagues, seeking enlightenment, but even from the pundits of food chemistry he obtained nothing more illuminating than that it was "out of their line."

The statement of our Yonkers contemporary is lacking in detail. What kind of strength is it that qualifies the taste of the whitewash-influenced butter? We recall many years ago in reading "Trilby" that *Svengali* protested against the daily baths of the Englishmen in Paris on the ground that it "made them weak." A bath once a week, he thought, was more wholesome, and once a month better still! Du Maurier questioned the efficiency of one bath a month as compared even with none at all, and ventured the opinion that anybody could grow strong that way. He also declared that some persons did not care for that kind of strength.

Our experience is that butter exposed to the air even in an unwhitewashed cellar will also develop a "strong" taste. Professor Arrhenius, in telling of his early experiences one evening some years ago at the Chemists' Club in New York, said that in working under van't Hoff on the development of electrolytic dissociation, the master required the employment of butyric acid by Arrhenius and his fellow assistants. This work continued for several weeks, and so long as it continued all the workers in that laboratory achieved such extraordinary strength as to be socially unavailable.

It may be that the assertion is not drawn from the treasure of experience, but is, rather, a theoretical conclusion developed by someone who has "dipped into" chemistry. This dipping into chemistry sometimes leads to surprising inferences. We recall how, when red wine was spilled on a tablecloth, it was customary to put salt on the stain to remove it. The explanation offered, which was wholly satisfactory to the dippers-in, was that "the tartaric acid in the wine attacks the sodium of the salt and sets chlorine free, which bleaches." The diminution of the wine stains was offered in proof of the correctness of the assertion.

A new enrichment has entered the atmosphere of many cellars of late years, and this is CO_2, which emanates from home-brewing. But in our chemistry books CO_2 is not suggested as an oxidizing agent for butter.

Perhaps, however, the editor of the *Star* meant the other kind of strength and wished to tell us that whitewash causes a fibrous crystallization of butter which

renders it hard to break or even to pull apart. Here we land in one of the most modern fields of research. Cotton fiber is now declared to be, definitely, a cellulose crystal. We should like to see the crystalline fibrous organization of butter demonstrated in the interest of fair play. Those colloid chemists are claiming everything nowadays, and if we can take butter away from them it may provide, for those of us who do not wear the colloid collar, a slight enrichment of life—or at least give us butter for our bread.

We hope the Yonkers editor will dip into chemistry some more. We find his conclusions interesting.

Coke Production And the Domestic Market

DURING the month of May, according to the recent estimate of the U. S. Geological Survey, the nation's output of byproduct coke amounted to 3,328,000 tons, a record production for any month in the history of the industry. Indeed, the 5 months of 1923 have themselves set records. In no corresponding period has so much coal been carbonized in byproduct ovens as during these 5 months. Thus it may be said that the coke industry is on a truly satisfactory production basis, but it is in the processes of distribution that the industry faces its most serious problems. These relate to the successful marketing of coke as a domestic fuel during periods of large demand for coke in the metallurgical industries. It is not enough to say that this domestic market should simply serve as a balance wheel for metallurgical supplies, taking the surplus not needed in the iron and steel business. The trouble with that theory is that it does not work. No permanent market can be maintained on any such basis.

It would be a very fortunate thing if the byproduct coke industry could regularly supply from ten to twenty million tons of coke for domestic fuel. This would represent a substantial percentage of the entire industry's output even on the enlarged basis which the more optimistic members of the industry forecast for the early future. It would, therefore, be a splendid balance wheel, insuring greater stability of operating conditions than can be hoped for with only the metallurgical industry as a customer. Furthermore, a great public interest would be served by this supply of coke, for such quantities of this smokeless fuel would do much to stabilize the price of anthracite and to spread over wider territory the opportunity of using a high-grade domestic fuel far superior to raw bituminous coal.

It is not to be expected that any such quantity of coke will be marketed as domestic fuel in the immediate future. But it is not too much to hope that 8 or 10 years from now there will be as great a demand as this. To insure such demand within a reasonable time, three things must be done; and we recommend consideration of all three to the coke industry for immediate application:

1. A regular supply of good quality, clean, suitably sized coke must be maintained for those dealers and those individual customers who are willing to handle and use this domestic fuel regularly. Intermittency in supply will certainly destroy these markets.

2. The price of this coke must provide regular and fair profit to the producer and to the local dealer, but it must not be allowed to become excessive during times of coal shortage on any theory of realizing "all the traffic will bear."

3. Sales of coke must be encouraged by producers only among those customers whose heating equipment is of adequate capacity to use this fuel; and these users or prospective users must be given a generous amount of assistance in learning how to burn the fuel efficiently and conveniently. Such educational sales effort will be an investment for stable business conditions.

The Eagle Screams Again

THE steaming records which the Leviathan so handily captured in her recent trial trip are the first sea records of the kind to be held by American ships since the dead and gone days of the clipper and the Yankee sea captain. Once, and for long, America led on the seas. It cannot fail to be a source of pride and satisfaction that we lead again. Let us all join together in such support of our marine that this place may be maintained.

Behind the cheering and the enthusiasm that goes with record breaking there is, however, another phase of this accomplishment that brings deeper and more lasting satisfaction to those of us who are engineers. Two years ago the Leviathan lay at her Hoboken pier a floating wreck. Today she is by far the finest, fastest and most luxurious of passenger carriers. American ship engineers, who are not accustomed to this class of work, carried through their novel task with the sureness and ability of veterans. And behind them was a veritable army of American mechanics led by American engineers—mechanical, electrical, chemical and metallurgical.

If you have ever had cause to doubt, now is the time to renew your faith in the capacity of American engineering talent to do a big job in a big way!

The current number of the *Quarterly Review*, one of our most dignified British contemporaries, contains an article on professional football which if not interesting in any other particular would be of value because of one single sentence that it contains. That sentence relates to the rule book prepared by one of the British athletic associations for the guidance of association football in that country. The comment is:

> The rules of the new association were so simple, so plainly worded, so brief and so careful of the niceties of English grammar that they came as a revelation to footballers.

Were the manuscripts received by an editor worthy of the same comment his surprise would be no less than that of the "footballers" referred to. In that one sentence there is an almost perfect definition of good writing.

Recently we received a letter from a man whose stationery announced that he was an "advertising engineer." We do not know what kind of an engineer that is, but the incident reminded us of a story of a concern that advertised for men during a recent labor shortage. Among the applicants for jobs was a man who said he was a machinist. As the company was sorely in need of such, the chief machinist was sent to examine the applicant.

"You are a machinist?" he asked.

"I am," proudly replied the man.

"Where have you worked?" was the next question.

"In Henry Ford's automobile factory."

"What did you do there?"

"I tightened nut 36."

Corrosion
The Gourmand of Industry

The Amazing Toll of Equipment and Material Because of Corrosion Creates a Problem of Great Economic Significance. It Represents a Call to Action, Unified Effort and Leadership

A WELL-KNOWN man said, quite recently, that the amount of metal consumed by corrosion in a given year was greater in amount than our enormous pig-iron production. Such a statement is dramatic and may or may not be accurate. It fulfills its purpose if it only makes us think. If corrosion is so gigantic a menace, it is high time technical men should wage a united war against it.

Of course, there has already been splendid effort. The National Research Council has been sponsoring corrosion work for several years, interesting bodies of scientists and technologists in the many problems. Committee B-3 of the American Society for Testing Materials has already begun a study of the broader aspects of this tremendous problem. Individual workers have done notable service. W. S. Calcott, whose paper was presented at the meeting of the American Institute of Chemical Engineers, has carried out an exhaustive series of tests running over 6 or 7 years of work in the laboratory of the Du Pont company. A group of research men from the Massachusetts Institute of Technology has made significant progress in the study of the causes of corrosion and in the analysis of the contributing factors. For years the problem has been debated in the American Electrochemical Society. The corrosion of mine waters has been a feature of mining journals for a long time. Atmospheric corrosion, soil corrosion, the corrosion of water pipes and a dozen related subjects have deserved and received attention.

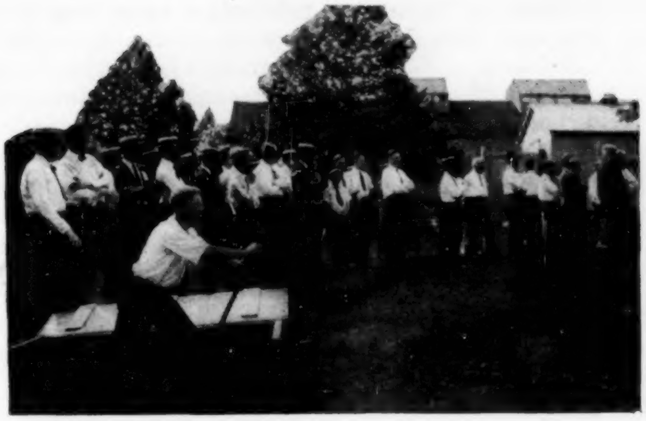
All of these efforts have helped, but the attack remains unorganized and the successes are local successes. If we are to achieve marked success, some one must lead. There must be a real correlation of results and of theories, but whence will the leadership come and of what nature will it be?

Last week, in Wilmington, the American Institute of Chemical Engineers passed a resolution that provided for the appointment of a committee on corrosion to organize the study of corrosion, with particular reference to chemical engineering problems. These problems differ from those of atmospheric corrosion. It is a province of the general study, and yet it is the fundamental province. The Institute committee is charged with four functions: First, to encourage research in corrosion problems; second, to collect actual data in plant practice; third, to review the results and pass on them; and fourth, to publish monographs on the subject, under the seal of the Institute. A comprehensive survey, and if it is handled with vigor and vision, there can be little doubt that the data collected will be unique in the corrosion field and that satisfactory theories will result. This last is a broad statement, but the proof lies in the experience and the habits of the chemical engineer. Corrosion is his meat and drink. Every day presents him with new data on the subject; every plant he builds brings him problems in corrosion—he can almost be called a corrosion engineer. Thus we see, in prospect, a field of the richest experience, ready for the useful organization of its knowledge. This committee has a unique opportunity for real industrial service.

Here is the logical source of leadership in attacking corrosion. A mere process of collecting data from the chemical engineers of this country would focus an unequaled wealth of experience on the problem.

The intelligent interpretation of these data, the stimulation of appropriate research along corrosion lines and the ultimate publication of material collected in a form which will make it available — these things build up an ideal of achievement that will be worth striving for.

The American Institute of Chemical Engineers has dedicated its energy to a fundamental economic problem—a problem involving the elimination of stupendous waste. May it make good use of its opportunity and become the inspiring leader in this campaign.



American Institute of Chemical Engineers in Action

The Fifteenth Semi-Annual Convention Swelters in Wilmington, but Is Treated to a Royal Entertainment and a Technical Program With Several Very High Spots

EDITORIAL STAFF REPORT

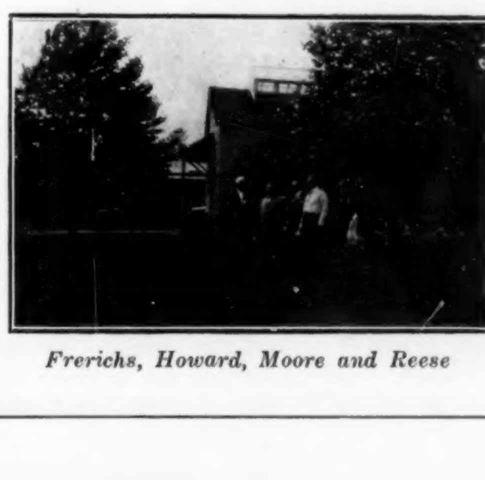
THREE HUNDRED AND TWO registrations was the record-breaking attendance at the fifteenth semi-annual meeting of the American Institute of Chemical Engineers in Wilmington. June 20, 21 and 22 did their utmost to prostrate the entire convention, as the official temperature hovered close to three figures, but the program moved along smoothly and enthusiastically. Too much praise cannot be given to the local committee. Everything went perfectly and there was great deftness displayed in altering the program for the comfort of visitors—for example, an extra hour's sail on the river to cool the perspiring crowd. Dr. Reese, the chairman, Mr. Zeisberg, the vice-chairman, and Messrs. Bennett, Chambers, Berg and Rhodes have set a standard at which subsequent committees must shoot.

Wilmington is a little town which suddenly awoke to find itself a big city and is still in process of orientation. Huge industries beginning with Du Pont and proceeding through the Joseph Bancroft & Sons cotton-finishing plant, Jessup Moore, paper; Hercules Powder Co., the Electric Hose & Rubber Co., the Bond Manufacturing Co., the New Castle Leather Co. and many others make the place a gold mine of information and interest to the chemical engineer. So with an efficient committee and a unique center of industry the story can almost be left to one's imagination.

It is whispered that a new organization was born at the meeting—an organization of Oratorical Chemists. Too much must not be said, however, as membership is exclusive and the reporter is a candidate for election. A counter organization is also reported which has affiliated itself with gas warfare defence service.

A real innovation of considerable significance was a "get-together" staged by some of the younger members of the Institute for the purpose of becoming better acquainted with one another. Nearly fifty were there and each gave a 3-minute talk on his education, experience and present affiliations. It was voted a huge success and will undoubtedly develop into a permanent feature of the meetings.

Socially the Wilmington meeting was most enjoyable. Dr. and Mrs. Charles L. Reese received the Institute at their home Wednesday afternoon. A supper dance was tendered the visitors on Wednesday evening at the Hotel DuPont. The boat ride to and from the Jackson laboratory has already been referred to as a life saver. Mr. and Mrs. Pierre du Pont welcomed the Institute to their famous conservatory 20 miles from Wilmington, near Kennett Square, Pa. In addition to flowers and rare plants the conservatory contains a most magnificent organ. The ride to and from the conservatory through beautiful country ran a close second to



Frerichs, Howard, Moore and Reese

the conservatory itself. As a farewell the Institute was entertained at supper by Mr. and Mrs. Irenée du Pont at their new home near Wilmington.

All of this can hardly reflect the spirit of any Institute meeting. A visiting engineer of another breed said he found the crowd approachable, free from any professional stiffness, genial and friendly. It is that spirit that makes the members attend and keep attending and that vitalizes all Institute programs. It represents a high type of professional relationship.

Important Institute Business

Significant Changes in Attitude Toward Convention Program — Next Two Meeting Places Selected and Subjects of Technical Programs Determined

THE secretary, the treasurer and a number of standing committees of the Institute always report at the semi-annual meetings. A certain percentage of the items is routine and relatively uninteresting, but there is always a large amount of meat that is of wider interest than to Institute members only. The secretary reported a total of 592 members, which represents a normal increase over the former number. It was predicted that the increase in the number of student branches, which are to be mentioned later on, would probably increase the junior membership list within 4 or 5 years. The treasurer's report indicated a healthy condition of the Institute's finances—a return to the former healthy condition, which has been due largely to a careful budgeting by this administration.

Publication Committee Protests

Chairman Zeisberg, of the publication committee, protested against the waiving of the 60-day rule, which requires that papers be submitted to the Institute at least 60 days prior to the convention date. This rule was waived this spring by the Council on a request by the secretary, because relatively few papers had been received. The chairman then pointed out that eight papers had been received up to April 16 and that three other papers which were not accepted had also been received. This, the chairman said, would have made a fairly presentable program. Of those papers that were not submitted on the required date, seven were not submitted at all and three were withdrawn after being submitted. This included five papers which actually appeared on the final program.

The chairman pointed out the absolute necessity of deciding earlier on the program for a given meeting and on the place, and he also suggested that since the publication committee was responsible for the acceptance of papers, it should also be responsible for the program itself. This was put in the form of a motion and considerable favorable discussion ensued. The motion was finally carried. This discussion is important and both members and non-members of the Institute should take cognizance of it. It serves ample notice that no papers for an Institute program can or will be received later than 60 days prior to the convention date. This will permit preprinting of papers and will enable a more intelligent discussion to take place at the time of the meeting.

Next Meeting, Washington

The Council had been ordered by the Institute to select the next meeting place, and had chosen Washington, about 2 months ago, the meeting to be held on Dec. 5, 6, 7 and 8, 1923. The Washington meeting will be in general charge of the Washington members of the Institute, prominent among them being W. M. Corse, of the National Research Council, and H. E. Howe, of *Industrial and Engineering Chemistry*. The publication committee then made a further report on the program for the coming meeting and suggested that the Washington meeting presented an unusual opportunity for the membership to become familiar with the work of the Washington bureaus. A day will be spent, for example, at the Bureau of Standards. An address by the director, followed by some discussions of research that is being carried out at the bureau, will take place during the first part of the morning. Later in the morning, and during the whole afternoon, the immense laboratory at the bureau will be inspected under competent guides, the members being taken to those places that are of most absorbing interest to them. The next day the Department of Agriculture will be inspected, the Bureau of Chemistry, the Bureau of Soils, the Bureau of Animal Industry and the Fixed Nitrogen Laboratory being among those things that will claim the attention of the Institute. There will then be a morning of miscellaneous papers which always turn up at Institute meetings and an inspection of the Bureau of Mines on that afternoon. Visits to certain institutions are planned, such as the Bureau of Engraving and the Patent Office. To any one who is at all familiar with Washington and the work of our national bureaus, this meeting will commend itself as a unique opportunity.

Start of the Safety First for Clay Pigeons Movement

And at Denver

The 1924 summer meeting will be held at Denver, July 15, 16, 17 and 18. Beet sugar and Western industry in general are to be the topics of the Denver meeting. Beet sugar, because perhaps more than almost any other industry the unit processes of chemical engineering are prominent therein and because, further,

Denver is a center of the beet sugar industry and the home of the largest and most progressive beet sugar company—the Great Western. The other papers on Western industry will include such related subjects as metallurgy and mining and those industries that are indigenous to the great West.

The report of the Council showed that three student branches had been approved and established—at Brooklyn Polytechnic, Armour Institute of Technology and the University of Michigan. The Council also reported a large number of miscellaneous items. Dr. Reese had been selected as representative of the Institute on the National Research Council. The licensing of engineers had been campaigned against in New York, and a postponement of the date when registration was to be required had been effected. The Council voted against establishing a life membership in the Institute as being inconsistent with its code of ethics, and finally there was reported with great regret the death of Parker C. McIlhiney, of New York City. Appropriate resolutions were adopted by the convention.

Plant Visits Unique

Cork, Rubber Hose, Leather, Cotton Finishing and the DuPont Laboratories Contribute Liberally to the Education of the Visitors

THE FIRST DAY found the members in a quandary. Either the cork plant of the Bond Manufacturing Co. and the plant of the Electric Hose & Rubber Co. or the explosives testing and ballistic laboratory of the Du Pont Co. could be visited. The crowd that went on the first trip saw among other things a remarkable method of vulcanizing rubber hose. Lead pipe is extruded in appropriate sizes and the rubber tubing inserted subjected to more than 100 lb. pressure inside and vulcanized, using the lead pipe as a mold. The pipe is then cut away and put back in the melting pot.

At the DuPont testing laboratory the ingenious machines for measuring projectile velocity were inspected and in addition the visitors were invited to take part in some trap shooting. This was prosecuted with enthusiasm but with small skill. The clay pigeons were much more frequently broken by colliding with mother earth than by being overtaken with bird shot. However "a good time was had" and the anvil chorus on the sidelines was overjoyed by twenty-two straight misses in one round.

The trip to the New Castle Leather Co. was most instructive. The process of dehairing by means of enzyme was shown, the skins being first softened and then mixed in a vat containing the enzyme with carefully controlled alkalinity. The hair can then be rubbed off by a roll. The subsequent treatment of the skin to produce leather is an amazing process in its complexity. Distinctly it is an art and not a science, although chemical engineering skill is beginning to make itself felt and it is safe to predict an era of interesting development for the industry. A parenthetical proviso must be tacked on, however, that the technologists respect the empirically achieved triumphs of these industries, else much will be lost.

The Jackson Laboratory is a thrilling institution. It is the center of the DuPont dye work. A group of magnificent buildings on the banks of the Delaware house the personnel and equipment. A trip through the buildings is impressive, but more impressive is the

Hotel Du Pont, the Headquarters for the Meeting

technical strength of the organization revealed in its personnel. The modern research laboratory with its perfection in equipment, including such nice apparatus as a quartz spectrograph, a new electrically heated melting point apparatus with microscopic observation, numerous potentiometers, etc., is all that could be desired. The semi-plant-scale work, which is operated on a cost basis in competition (at the start) with the plant process, is substantial. Many manufacturing plants are less well put together than these semi-works plants. New processes and high-pressure experiments are run in separate brick compartments controlled from behind brick walls.

One of the most interesting divisions is the dye testing laboratory, where there are various departments having complete small-scale equipment in the application of dyes to all materials. A leather section, a paper section, several large laboratories for textiles, a department where competing colors are tested—all contribute to make a formidable sales research and sales service laboratory. As Dr. Herty said in a talk that evening on "The Dye Industry in America": "That plant [The Jackson Laboratory] and the happy realization of the existence of many other similar though smaller units should give us a confidence and an enthusiasm that the dye industry is here to stay. Nor need we rely on impressions, for the results are at hand. Dyes are supplied to the American trade of as good and better quality as before the war, and in addition to that at a price that is relatively as low."

Finally we were taken through the cotton-finishing plant of Joseph Bancroft & Sons Co., where they are treating 12 to 14 million yards of cloth per month with a capacity of 16 million. Gray goods as they are called are dyed or bleached or mercerized or filled or finished in any other possible way and shipped to the consumer. Practically no goods are owned by the company. It is only the agent for mills that fabricate the goods and it ships to the mill's consumers. Some of the operations are dramatic, notably the singeing of the nap where the cloth passes over the top of two red hot cylinders at a rate of 225 yd. per minute.

The sentiment of the visitors was voiced by one of them, who exclaimed after gazing at the process for several minutes: "It isn't so. They can't do it!"

Technical Program Features

Activated Carbon and Silica Gel Shared Stage Center at First. Valuable Discussion of Adsorption Resulted. Later Corrosion and a Lively Symposium Held Sway

PERHAPS the most disappointing feature of the technical program was the large number of papers that were withdrawn. This called attention to the necessity of adhering rigidly to the rule requiring papers to be submitted 2 months in advance of the meeting. Five papers listed on the program were withdrawn between the time the program was printed and the time of the convention. None of these five was submitted at the required time, and it is therefore permissible to draw the conclusion that if a program is made up 2 months in advance it will be completed on schedule.

Still another criticism made by many members was the absence of adequate editing in some papers. It seemed to be the consensus that a presentation time of 20 minutes was ample for any Institute paper, and any paper requiring more time than that should not be presented *in toto*, but be abstracted and a discussion carried on from the preprint distributed some time before the convention meets, to the members who are coming to the meeting. These comments are reportorial comments and not those of an editor. These sentiments seem to have crystallized to such an extent that it is almost certain that the mistake will not be repeated at future meetings.

A Review of Activated Carbon

Dr. Frederick Bonnet, of the Atlas Poowder Co., read an interesting review of the theory, evaluation, manufacture and use of chars. He refers to the theory of Gibbs and Freundlich, who developed the equation: $X \div M = KC^{1/n}$ for evaluating or determining the activity of chars. Similarly Gurwitsch claimed that the heat evolved was a measure of the adsorptive forces, and pointed out that unsaturated compounds gave the

Just Before All the Coats Came Off

greatest heat evolution; thus adsorption seems to vary as the concentration of various molecules and as the "energy of adsorption." These two components, however, do not lend themselves to a convenient measurement.

The problem of evaluating chars depends largely on what properties are most valuable in a given char and to what uses it is to be put. For example, in chars used in gas adsorption work or in color adsorption work, the fineness may be important, the filterability may be extremely important, the structure, neutrality, moisture, ash and soluable material content are all, in one way or another, intimately connected. Tests for these various properties have been carefully worked out and Dr. Bonnet gave some of the details of testing. Gas adsorption, for example, is usually measured by the so-called "accelerated chlorpicrin" test, the activity of a char being measured in minutes, which represents the number of minutes which that particular char has adsorbed completely a given concentration of chlorpicrin gas. Color adsorption has been found by Zerban and Saunders to follow the Freundlich equation already referred to. Again, fineness is always measured by a wet treatment test, and the other properties referred to are measured in obvious ways.

To most people it is an interesting comment that

bone char actually contains only 10 per cent of carbon on a matrix of calcium phosphate. Vegetable chars have been designed to have more carbon on the matrix. It is desirable, when manufacturing vegetable chars, to see that charring does not take place too rapidly, nor at too high a temperature. In either of the above cases, a layer of graphitic or gas carbon will form on top of the amorphous carbon. To prevent this formation, a mild oxidation is usually carried out. If either air or carbon dioxide is used in carrying out this oxidation, an endothermic reaction takes place which causes local overheating. On the other hand, steam causes an endothermic reaction, and this has been found, in practice, to be extremely desirable.

The reaction seems to take place in two stages. First, the low-temperature heat gives an amorphous base carbon, and second, the high temperature removes the adsorbed hydrocarbons, which increases thereby the porosity of the char. Actually, the reaction is carried on in a rotating, inclined kiln, in a thin layer, so as to avoid a long contact of the hydrocarbon gases with the heated carbon. The temperature rises until it reaches 850 to 1,100 deg. C., when the steam zone is reached. This material is called "Rotite" and after emerging from the kiln is ground and acid washed. It has been found that the most highly activated chars can be made by using air. Perhaps the newest development in vegetable chars is the pretreatment of the raw material with such reagents as sulphuric acid, zinc chloride and hydrochloric acid. These reagents seem to give a better char than that obtained from wood which has been dehydrated. The explanation of this is that the hydrogen and oxygen are removed from the char matrix.

A second paper, on the abatement of industrial stenches by activated carbon, was read by A. B. Ray. This paper appeared in the June 25 issue of *Chem. & Met.* and needs no further comment at this time.

In commenting on the activated carbon papers, R. H. McKee pointed out that in the distillation of oil shale it was not necessary to heat above 400 deg. and, furthermore, no air was necessary to get rid of the residual hydrocarbon. Therefore, by analogy, it did not seem as though the residual hydrocarbon explanation of aërating, as given by Chaney and Ray, was valid. Furthermore, he pointed out that when an acid-treated carbon which was very successful in decolorizing sugar had been treated and washed with alkali, it lost its decolorizing power for sugar, but was able to pick up gold from cyanide solution, which the acid-treated solution would not do. The properties were again reversed as the carbon was treated with acid a second time. Is this to be explained by a fundamental change in the carbon, as suggested by Chaney and Ray, or not? In answering this query, Chaney pointed out that the evidence for two different modifications of carbon was based on crystal structure evidence, so that they actually did exist. No other confirmatory evidence needs to be called to account. In answer to another of Professor McKee's points, Dr. W. A. Patrick pointed out that chemical polarity would explain the difference between the acid- and alkali-treated carbons. In other words, there is simply an exchange of ions.

H. L. Chute emphasized that there was a pre-war use of char in the deodorizing of whiskey, and pointed out that aëration had been necessary in the revivification of this material. In answering a question by Henry Howard, Dr. Ray stated that the carbon used in the elimination of industrial stenches had been revivified constantly for the past 5 months, the leather plant having been in operation continuously during that time, and that the carbon was apparently in as good condition now as at the start.

Disembarking at the Jackson Laboratory

The Properties of Activated Carbon

N. K. Chaney, of the Union Carbon & Carbide Corporation, read a paper on the properties of activated carbon with relation to its industrial application, based on research he has done with A. B. Ray and A. St. John. The paper discussed comprehensively the general properties of carbon, the methods and definition of activation. This was followed by a discussion of the principles of gas and vapor adsorption and from this to the absorption of substances from liquids by carbon. In this part of the paper the relationship between absorptive capacity, retentivity and apparent density was developed and in addition to this the principle of chemical polarity. This has to do with the effect of electric charge on absorption. It was shown also that absorptive power was proportional to the degree of activation. These three principles permit a rationalization of existing data.

The Capillary Theory of Adsorption

W. A. Patrick discussed his paper, which carries the above title, most interestingly. The subject at first seemed one of theoretical significance only, but there are already several practical applications and it helps in understanding the mechanism of adsorption. In introducing the subject Dr. Patrick said that it should be noted that there never had been any experiments on adsorption which did not include capillarity as one effect. In other words, there have been no plane surface experiments on adsorption. Dr. Patrick then developed the fundamental relationship of capillarity expressed in terms of vapor pressure, radius of curvature, surface

tension, molecular weight and density, etc. The equation is a familiar one, $\ln \frac{p}{p_0} = -\frac{2\sigma M}{RT\delta r}$. In using this equation it is necessary to assume pores of molecular dimensions, in order to account for the lowering in vapor pressure produced in adsorption by silica gel. Experiments on sulphur dioxide, carbon dioxide and butane with silica gel gave a wide diversity of results to be correlated. Considering adsorption as the filling of the capillary pores of the adsorbent, it is essential to express the extent of adsorption not in terms of mass but in terms of volume. Then taking the basic formula of capillarity as a guide, it is possible to plot all points obtained in the above experiment on a single curve. This represents a relationship which is an approximation and from both practical and theoretical considerations must be regarded as empirical. From the practical standpoint it is obvious that capillary forces alone are not the only forces that would make silica retain gases, and from the theoretical side the above formula cannot be deduced from basic thermodynamic relationships of capillarity.

Cooling Off

However, this does permit us to say with considerable certainty that the main factors that determine the extent of adsorption of a gas are the physical properties of the liquid resulting from the condensation of the gas—namely, density, surface tension, vapor pressure, molecular weight, etc. Furthermore, we can conclude that the surface tension of a liquid exhibiting capillarity curvature is not constant, but changes with a radius. This variation is an idea of fundamental importance. If now we derive a thermodynamic equation and calculate some results of the adsorption obtained from the system sulphur dioxide-silica gel at various temperatures and pressures, we find that the two constants of the equation are not constants, and furthermore that the radius of the capillary spaces are of molecular dimensions. In some cases it is even necessary to assume that they are less than 0.2 $\mu\mu$ in diameter. Thus the derived formula cannot be regarded as a workable one. Applying the above ideas to dissolved substances, it is necessary to make certain changes, and it follows that the components of a solution that most easily wet the porous adsorbents will be adsorbed from solution and we are thus in a position to predict what component of a given solution will be adsorbed by silica gel at least qualitatively, and this Dr. Patrick was able to do in a number of cases.

In commenting on this paper N. K. Chaney stated that the specific chemical characteristics of various adsorbents do not conflict at all with the theory advanced by Dr. Patrick. Most of the adsorption phenomena of silica gel can be explained on a basis of the physical properties of the condensed liquid, whereas with other adsorbents the chemical polarity of the adsorbing material is of greater significance. Silica gel itself has practically no chemical polarity.

The next paper was presented by E. B. Miller, of the Davison Chemical Co., on the refining and recovery of petroleum products by silica gel. This paper is of considerable interest and will be reproduced either in abstract or in full in a subsequent issue of *Chem. & Met.*

Gas Absorption Apparatus

E. M. Baker, of the University of Michigan, discussed his paper on the theory of the design and testing of gas absorption apparatus.

An interesting attempt is made to devise what might be called an equilibrium unit for absorption systems—whether they be tourills, scrubbers, towers, etc. Under given conditions this will represent a given number of tourills or a given length of scrubbing tower. This is analogous to the "theoretical plate" for fractionating columns suggested by W. K. Lewis [*J. I. E. C.*, vol. 14 (1922), p. 492]. The expression in physical units is not an easy task, for the quantity equivalent to one unit would vary with the velocity of gas and liquid, the intimacy and vigor of contact and the rate of diffusion of the absorbable gas through the gas phase, the gas-liquid boundary and the liquid phase. Of course again the latter is dependent on nature of substance, pressure, temperature and many other factors. Earlier in the paper equations are worked out and values calculated which represent the gas absorption in a system composed of units in each of which gas-liquid equilibrium is obtained.

A most ingenious paper by W. A. Peters, Jr., described an automatic fractionating column which is working in some of the Du Pont plants. The complete paper will be published in *Industrial & Engineering Chemistry*. Finally, the paper by L. A. Pridgeon on "Calculations of Vapor Recompression Evaporators," which was published in the June 25 issue of *Chem. & Met.*, brought out several interesting relationships, particularly that between steam economy and capacity.

Prof. E. B. Badger, of the University of Michigan, commented on this work by saying that as far as he was aware this relationship was a new one.

Hydrochloric Acid Absorption With the Tyler System

J. R. Withrow, of Ohio State, reported some preliminary experiments on the absorption of hydrochloric acid gas in the Tyler vitreosil system. This system was described in *Chem. & Met.* Aug. 2, 1922. It will be recalled that Tyler absorption system is made up of units consisting of a special S-bend shape made of fused silica. Experiments were carried out with high concentration of gases so operating that their complete absorption of hydrochloric acid gas took place. Some quantitative figures have been calculated showing a marked difference in absorbing power for different concentrations of gas. Preliminary measurements on the

pounds of hydrochloric acid gas absorbed per square foot per hour were made and under conditions distinctly unfavorable to the apparatus 1.7 lb. has been obtained. More work is promised especially on dilute gases.

A Symposium on Corrosion

An Animated Experience Meeting Grew Out of Two Papers on Corrosion. The Informal Comments Showed Technical Discussion at Its Best

TWO PAPERS which came out of the Du Pont organization and were preprinted for the meeting served as a nucleus for an animated symposium on the general subject of corrosion and materials of construction. These two papers will be printed by the Institute as the first of a series of monographs on corrosion and will be available for distribution at moderate cost.

The first paper, by M. S. Calcott and J. C. Whetzel, grew out of a series of tests which have been carried out under Mr. Calcott's direction on materials of construction which were available for the fabrication of equipment. In other words, the conception of the research was not that of an inquiry into the nature of corrosion but of an empirical determination of the suitability of materials on the market. It was a service to the production department in enabling it to specify the proper materials for a given service.

Several notable innovations were followed throughout this work. The first was the preliminary exposure of the samples to the atmosphere for a given length of time. Corrosion of a freshly exposed surface is never representative of the actual corrosion that would take place in plant practice.

The second innovation was the expression of results. Formerly the corrosion results have usually been expressed in quantity dissolved per unit surface or mass. A better way is to express it in terms of inches per unit. This will more accurately represent the value of the apparatus in the plant. Yet another important change is the treatment of pits. Obviously a piece of equipment is no better than its weakest point, and therefore if a single pit went clear through the metal the whole apparatus would be useless. Calcott therefore grinds off the surface to a point at which the whole surface is at the same level as the deepest pit. This loss in weight is regarded as an accurate measure of its corrosion-resisting qualities. It is then translated into inches per month, the unit mentioned above. Temperature was naturally controlled and other precautions observed.

In discussing this paper Jerome Alexander asked whether the effect of impurities had been noted. As anticipated, tremendous variations in rate of corrosion had been observed both when the impurity occurred in the reagent and in the material. A consistent use of plant solutions as against laboratory reagents had to a larger extent taken care of this variation and given results which would be more likely to check plant performance.

A. E. Marshall pointed out that previous treatment of samples of fused silica and glass had been found necessary to get accurate corrosion results. E. P. Poste reported the same as true of enamel. A loss of glass might be observed in a very short time, whereas 1,000 hours' further exposure would reveal no corrosion. R. T. Haslam also confirmed the opinion that the loss in weight in the second 48 hours would be a more accurate standard.

Inquiry was made by Henry Howard as to whether metal passivity had been studied, as the Interstate Commerce Commission had approved iron drums as containers for hydrofluoric acid if the metal had previously been rendered passive.

Surface coatings were discussed, J. G. Vail pointing out that silica in municipal water supply would prevent absolutely the solution of lead. Similarly it will prevent the corrosion of aluminum and stop corrosion which has already started.

Failure of Welded Joints

Another interesting point was brought out by Henry Howard in discussing the failure of welded tanks. It was that acetylene-welded tanks are eaten away in 3 days at the weld in an oleum storage tank. In a similar service a roller-welded tank (made by Pusey & Jones) was still in service after 15 years. This was confirmed by the similar experience of other men.

The second paper of the symposium, by Harold Whittaker, was entitled "Materials of Construction of Chemical Apparatus." The author said that if the paper had a message it was that chemical engineers get away from considering the initial cost as the most important item in the purchase of chemical equipment. Other items such as the cost of shut-down, the cost of replacement, etc., loom easily larger ultimately than the initial cost. Price of equipment that will last three times as long can afford to cost three times as much and then some.

A number of comments on industrial materials were made, such as the omission of silver as material for acetic acid condensation coil and the disastrous effect of small quantities of hydrochloric acid therein.

A long discussion of enamel apparatus ensued, in which E. P. Poste, speaking for the industry, pointed out that their largest field was in the foodstuff industry and that in chemical equipment, enamel ware was "the last resort," due to a number of causes.

Finally, A. E. Marshall presented a resolution to the Institute calling for the appointment of a corrosion committee. The significance of this move has already been discussed on page 4 of this issue of *Chem. & Met.*

A short paper on "Economic Statistics" by R. K. Strong was read and a paper by David Wesson on "Fullers Earth" was read by title. These papers closed the technical meeting and the session adjourned until the December session in Washington.

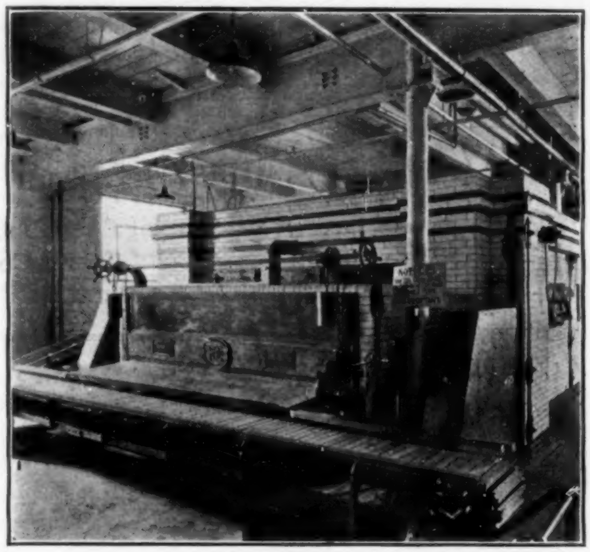
Editorial Correction

Chem. & Met. wishes to express sincere regret for an error of omission. In the issue of June 18 a short article appeared entitled "A Gage of Purchasing Efficiency." This was part of a longer article, the rest of which will be published in a later issue. The author, L. E. Ashley, of the firm of Colby & Ashley, engineers and accountants, has contributed a valuable thought for production men and certainly deserved a better fate than the omission of his name.

The Chemical Engineer in Bakery Management

By G. L. Montgomery and A. G. Wikoff
Assistant Editors, *Chem. & Met.*

The best available mechanical devices are joined with thorough laboratory control under the supervision of a trained engineer to make the Atlas Bread Factory an efficient commercial production unit.



The traveling oven—discharge end with bread conveyor and speed control. Note the sign, an example of management methods employed.

THE EXTENSION of the chemical engineer's field of action to cover industrial management has been rapid of late years. This is especially so in those industries where exact chemical control is necessary for the best commercial results. An enlightening example of how this tendency works out in practice is the Atlas Bread Factory in Milwaukee, Wis.

The owners of this plant had the necessary vision to see that commercial advantages could be derived by applying the results of scientific research. For this reason they actively supported the research work carried on by the American Bakers Association through its research organization, the American Institute of Baking. A chemical engineer, G. Cullen Thomas, was the first graduate of this institute and has been production manager of the Atlas plant since that time. The system of management and control installed under him is remarkable for the extent to which it eliminates the possibility of errors due to the human factor. It points a way not only for the baking industry but for many others where similar problems could be met in a similar manner with sound commercial results.

How Materials Are Handled

The materials used in the bakery include flours of various types, yeast, salt, sugar, milk, malt sirup, shortening and small quantities of various other things such as spices. Of these, flour is the most important. It is also the most subject to deteriorating influences. Large stocks of flour must be kept on hand for proper aging under controlled conditions before fit for use. During this time the flour must be guarded from such diseases as mold and from the attacks of insects and rodents.

Flour is delivered in sacks from the Atlas company's own mills. These sacks are tiered seven high on "dead" skids and taken by hand-lift trucks to the flour storage room, which occupies about half of the basement. During storage the sacks remain in tiers on the skids. This serves to keep them off the floor, thus aiding ventilation. Also they are easier to take from storage for use when stored in this way.

The principal requirements for maturing are control of the temperature of the flour and good air circulation. In order to maintain a uniform temperature of 70 to 72 deg. F., the storage-room is provided with a duct system supplying warm air in the winter months, warmed by being drawn over a bank of steam coils by means of a fan. The outlets of the ducts are near the floor level, so that the stream of warm air passes underneath the skids and rises up through the stacked flour, keeping it at uniform temperature. In warm weather the system is reversed, the air in the storage room being sucked out through the ducts and replaced by fresh air through the windows.

Conditions in this flour storage space are recorded on a temperature recorder and a humidity recorder. Complete automatic control is not necessary, as the maturing process is a long one and changes in condition do not matter if of short duration. The daily record charts of temperature and humidity enable the management to maintain conditions sufficiently under control to meet the requirements.

The other materials are mostly subject to deterioration at ordinary room temperatures and must be refrigerated. All of these are received in such comparatively small quantities that no special provision for handling is made, the hand-lift trucks and skids serving. The yeast is stored in a refrigerated chamber on the second floor, adjacent to the dough-mixing room. One day's supply only is received each day. This is stored on the bottom shelf and yeast is used from the top shelf. When the supply on the top shelf is exhausted that on the shelf below is moved up, making room for next day's delivery. In this way the oldest yeast is used first and no yeast stays over 24 hours in the plant.

The materials other than flour that require no refrigeration are stored in the same room with the flour. Those materials which are refrigerated, excepting the yeast already mentioned, are kept in one of two cold storage rooms in this basement. These rooms are maintained at a temperature of 44 deg. F. at all times.

The supply of cooling brine for the refrigerating coils of the various rooms mentioned throughout the plant is controlled by the Johnson Service Co.'s thermostat system. In the small room which houses the Vilter

ice machine, an insulated brine tank is kept automatically at 10 deg. F. Whenever the brine, which circulates from this tank through the various cooling coils, raises the temperature of the tank, the ice machine automatically starts working.

Brine from the cooling tank is distributed through the various coils by one centrifugal pump. The Johnson system, when the temperature of a particular cold storage room rises, opens the valve in the header of this pump which directs brine to that room, at the same time starting the pump. In this way the operation of the whole refrigerating system has been made automatic and gives maximum efficiency with minimum attention.

As various flours are used in the manufacture of wheat bread, blending is necessary. This is done in a blender located in the flour storage room. The proportions are determined by the spacing of partitions which divide the blender hopper into compartments. This spacing being set to requirements, each compartment is filled with its particular kind of flour and the rollers feed these flours into the blender in the ratio determined by the width of the compartments, to be mixed into a homogeneous mixture. The flour then passes through a bolting reel which breaks up lumps, removes foreign material and aërates it.

Flour is elevated from the basement by two single chain belt conveyors, one for wheat and one for rye, to bins in the pent house over the second story. The flour is fed from the bucket elevators into a screw conveyor which empties into any one of the four bins, subject to control by wires and hand levers from the basement. In this way the operator of the blender and the reels for wheat and rye flour also directs the discharge of flour into the appropriate bin, which serves to reduce labor and to prevent mistakes by putting the whole thing up to one man. Each of the bins has an additional bolting reel at its outlet.

The evidences of a trained scientist's management appear again in this handling of flour. The flour is from the company's own mills, so the sacks are used over and over. To prevent infection of the bakery, these sacks, on being emptied, are subjected to a most thorough cleaning, every particle of flour and dirt being removed. The recovered flour is sold for making paste or foundry cores.

In Fig. 1 is shown one side of the room in which the dough is mixed and fermented. Since fermentation is a very delicate operation, affected by even slight changes

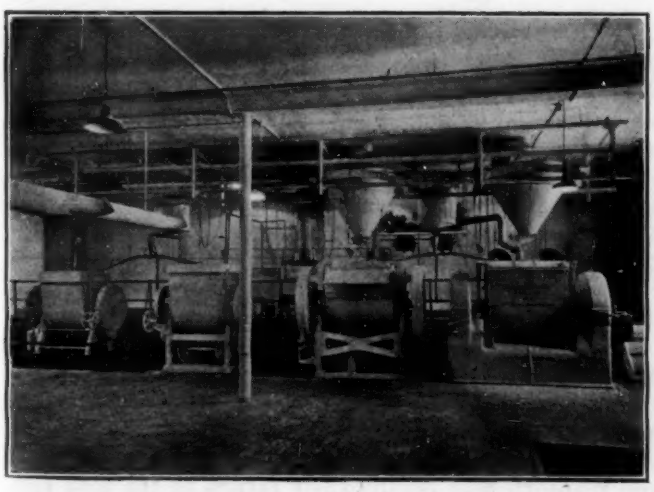


FIG. 1—THE MIXING ROOM—AUTOMATIC AND SPOTLESS

Kind........ No........

ATLAS BREAD FACTORY

Fermentation Record

Mixer No........ SPONGE Trough No........

Temp. Time

.... Mixer Started ....

.... Mixer Stopped ....

Gross Weight........ Net Weight........

Mixer No........ DOUGH Trough No........

Temp. Time

.... Mixer Started ....

.... Mixer Stopped ....

.... 1st Cut Over ....

.... 2nd Cut Over ....

.... 3rd Cut Over ....

.... To Divider ....

Gross Weight........ Net Weight........

Room Temp........ Humidity ....

Remarks........

Time Temp.

.... Mixer Started ....

.... Mixer Stopped ....

Gross Weight........ Net Weight........

Mixer No........ DOUGH Trough No........

Time Temp.

.... Mixer Started ....

.... Mixer Stopped ....

.... 1st Cut Over ....

.... 2nd Cut Over ....

.... 3rd Cut Over ....

.... To Divider ....

FIG. 2—FERMENTATION RECORD TAG USED IN THE ATLAS PLANT. OBVERSE AND REVERSE OF TAG

in temperature or humidity and extremely susceptible to infection, special precautions must be taken to protect it. This mixing room is maintained constantly, day after day, at 78 deg. F. temperature and 80 per cent humidity. In addition, the air is changed often so that all possibility of its becoming infected with unwanted bacteria is eliminated. The installation which performs this is an automatically controlled air conditioning system manufactured by Bayley Manufacturing Co., of Milwaukee. Although this machine is automatically controlled, a continual check is kept on conditions by means of a recording thermometer and a recorder which registers relative humidity directly without computation.

Referring to Fig. 1, note the mixing equipment of four J. H. Day mixers and two Werner & Pfleiderer track-mounted weighing hoppers. These last serve to transfer flour from the outlets of the bins in the pent house above to the mixers below. A hopper is filled from the proper bin by setting it beneath this bin and pressing a button. This starts a motor-driven screw which feeds flour into the hopper from the bin. While flour is thus in motion, a signal lamp warns against moving the hopper. When the weight for which the hopper is set has been supplied, the motor automatically shuts off and the signal light goes out. The flour is then discharged into the proper mixer by a hand valve in the hopper bottom. Water is supplied in a similar way from the automatic weigh tanks which can be seen between each pair of mixers. The temperature of this water is controlled by adjustable thermostatic valves.

Other ingredients of the dough are weighed out in cold rooms the doors of which can be seen back of the largest mixer. One of these rooms has a hand elevator connecting with the cold rooms in the basement and serves as an auxiliary storage. The other is where the ingredients are weighed out in proper quantity.

These last ingredients are added to the flour and water in the mixer, which is then operated until the dough is developed. On the two larger mixers, each of which contains a maximum batch of 1,000 lb. of flour, very exact mixing control is obtained by means of an electrical device which may be set to stop the machine automatically after a given number of revolutions. This permits the operator to attend to other duties and hence saves labor without the possibility of having spoiled batches. Since the friction in these large mixers might cause an undesirable temperature rise, cold air is automatically supplied, through the hood and piping shown, while the mixer is in operation.

Fermentation Put Under Control

After mixing, the dough is transferred to large steel troughs in which fermentation is allowed to proceed in accordance with the requirements of the particular mix. In order that there may be no mistake made, there is a large board attached to one of the walls on which appears in large letters the various types of dough used, their ingredients and the exact procedure to be followed during their fermentation.

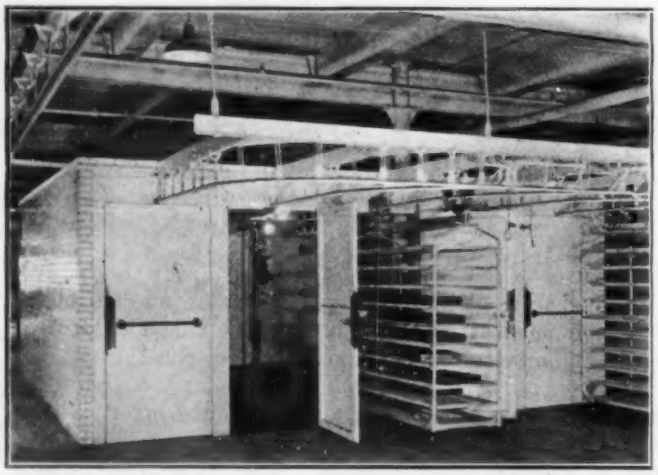


FIG. 3—FINAL PROOFING CHAMBER. NOTE THE AUTOMATIC TEMPERATURE AND HUMIDITY CONTROL AT FAR SIDE

In order that the office may have a record of these operations, tags, the obverse and reverse of which are shown in Fig. 2, are attached to each trough. When each entry is made the time is punched in the appropriate place by means of a time clock situated conveniently on a central column of the room.

Thus it will be seen that the conditions of mixing and fermentation, which are determined scientifically in the plant's laboratory, are quite exactly reproduced in the commercial operation. When mistakes occur or the finished bread does not suit, the manager is enabled to determine where the error is and prevent its recurrence.

From Mixing Room to Oven

When the fermentation is completed, the dough is passed through a chute to the floor below—the ground floor. Here it is first placed in the divider. This machine is adjustable and will deliver the dough in pieces of varying weight in order to make the various weight loaves which are marketed. From the divider the lumps enter the rounder, in which they are rolled into round balls and given a firm outer skin. These are dusted with flour to prevent sticking. The violent treatment of the divider expels most of the gas of fermentation, so the balls of dough are allowed to recover some of this in the proofer. This is a glass-inclosed case, subject to exact temperature and humidity control, in which the dough passes back and forth on canvas belts for a time of from 10 to 12 minutes. The dough is fed from the rounder into the space between two canvas belts which are stretched tightly and but a very small distance apart. This serves to flatten the balls into pancakes, in which form they ride easily on the canvas belts.

On emerging from the proofer the dough enters the molding machine, in which it is formed in the proper shape for loaves and filled into the baking pans. These pans are joined in groups of three or five. When the pans are filled, they are placed on the carriers of a Louden overhead carrier system, several of which are shown in Fig. 3. They are then placed in the tempering or final proofing chamber, through which the several tracks of the Louden system run. The final rising and fermentation of the dough take place in this room, again under controlled conditions. A Powers regulator is used here to keep the temperature and humidity at the desired point, which is done by means of steam coils and the admittance of live steam directly to the room. This regulator is shown against the rear wall of the room in Fig. 3, from which the room construction is also evident. Recording instruments are provided for giving a record of the conditions in this room.

The bread from the final proofer is brought to the oven, still on the Louden carrier, as shown in Fig. 4. This oven is of the latest traveling type, 90 ft. in length, designed and made by the Petersen Oven Corporation of Chicago. It has a hearth of the endless belt type made up of soapstone slabs supported on iron plates held between two heavy conveyor chains. Below the hearth is a horizontal firebrick partition which separates the combustion chambers of the coke-fired furnaces from the baking chamber so that none of the products of combustion enter the oven itself. The under side of the hearth thus receives heat by radiation from the firebrick partition so that its sections are hottest at the feed end, cool considerably during the baking process as they travel toward the discharge end, and reabsorb heat during their return to the feed end.

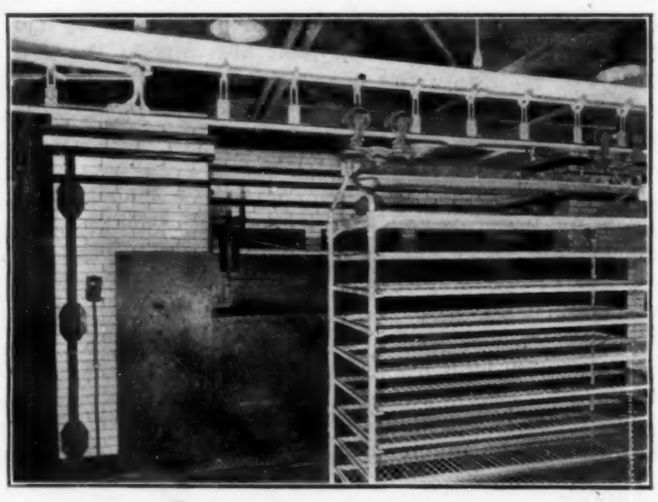


FIG. 4—THE TRAVELING OVEN. CHARGING END WITH LOUDEN CARRIER IN POSITION

Hot combustion gases pass through flues in the side

walls and through steel flues above the baking chamber to give top heat for coloring and carameling the top crust of the bread. The first section of the oven in from the feed is provided with a live steam connection, which permits baking with a damp heat for certain kinds of bread.

Speed of travel of the oven hearth is regulated by means of a Reeves variable speed transmission. The speed of the conveyors which take the bread from the oven is also regulated by this transmission, so that they are synchronized with the hearth travel.

For baking and combustion control, thermocouples are located in the baking chamber at intervals of 20 ft., beginning 10 ft. in, and also in the flues above and below the oven and in the stack. These are all connected to a Brown indicating pyrometer, so that the temperature conditions in all these places can be read. Permanent record is also kept of the temperature at several points in the oven by Brown recording pyrometers.

As an evidence of the engineering and administrative principles that have governed the layout of this plant, all the operations so far described are set on a standard time schedule, under the control of the manager; and the flow of materials through the plant is exactly in accordance with prearranged plans. Each machine is so synchronized that it takes the output of the preceding one, without delay.

For an example of one of the methods employed to accomplish this, note the large sign shown in the headpiece illustration. Instructions are conspicuously placed at each control point and in all departments for the men to follow and then the recording instruments permit the management to check up and see that they do follow them.

The discharge end of the oven is shown in the headpiece. The workers stand in front of the slat conveyor, take the pans as these are delivered onto the stationary hearth, turn them upside down over the conveyor and deposit the bread thereon. The empty pans are placed in a Louden carrier behind the operator and go back through the cycle.

The bread is delivered from this slat conveyor to the inclined belt conveyor seen in the left side of the headpiece and by this elevated to a point over the oven. Here it is discharged onto a belt conveyor, which takes it over the oven to a point where it is delivered to the cooling machine by a chute.

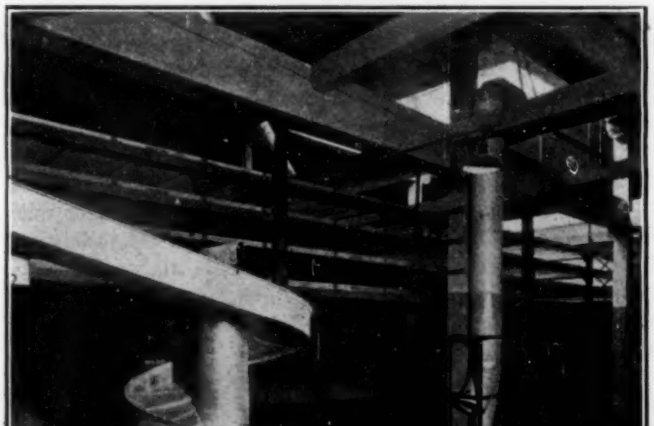


FIG. 5—THE BREAD COOLER, CHUTE, LOADING BELT AND WRAPPING MACHINERY

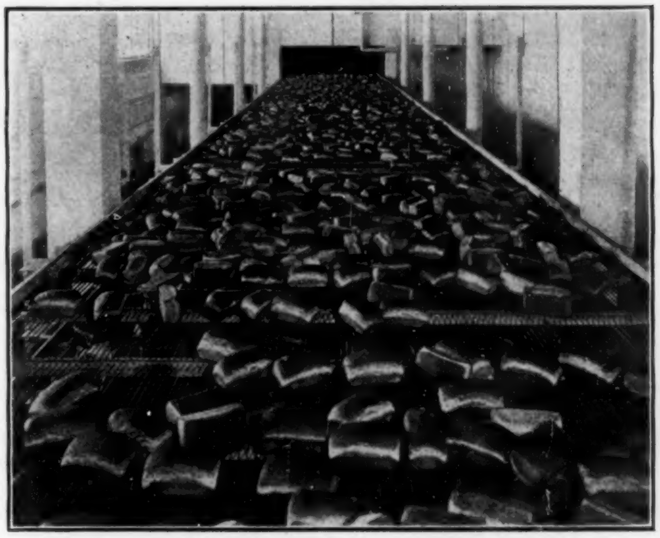


FIG. 6—THE BREAD COOLER IN ACTION

This cooling machine, shown in Figs. 5 and 6, is of the new type designed by the Mathews Gravity Carrier Co. It consists of a broad, open-bottom conveyor, similar in design to the slat type conveyor, on which the bread travels a distance of 360 ft. in four passes. During this travel the bread is subjected to currents of cold air from a ventilating system which serves to cool it thoroughly before it is wrapped and thus prevent sweating. The bread is allowed to take various times on this cooler, depending on conditions. A complete passage of the cooler can be made in from 40 minutes to 2 hours.

After cooling, the bread slides down the spiral chute shown in Fig. 5. It is delivered to one of two short belt conveyors, also shown in Fig. 5, which function as a merry-go-round, keeping the bread going back and forth till a worker is ready to pick it up and place it in the wrapping machine.

Wrapping is accomplished in Sevigné wrapping machines. These are placed near the merry-go-round and fed by hand. In them the bread is wrapped in wax paper, sealing being done by hot plates which melt the wax sufficiently to make it stick.

From this point the bread is taken in large tote boxes to the drivers' lockers, from which it can be loaded into delivery trucks without the drivers entering the building, as the lockers have doors both inside and outdoors.

Nothing has been said as to the complete cost records that are kept, permitting the manufacturing cost to be easily ascertained after each step of the process. Space does not permit us to describe this system, worthy of a complete article itself, in this paper; but it suffices to say that the accounting system is complete and at the same time so simple that its cost is a negligible factor.

The plant described above is a development of the past 2 years. The extent to which the most up-to-date engineering and management thought has been applied is noteworthy. Of course, there is a long way yet to go before it is completely automatic and management's burden has been reduced to its ultimate minimum. But the progress made in so short a time in an industry which has been so impregnably a hand-operated, rule-of-thumb industry is hopeful indeed as a forecast of the results which chemical engineering management is to accomplish in the near future.

Some of the Latest Developments in Gas Purification*

Extension of the Use of the Sodium Carbonate Process for Gas Purification During the Year Has Developed Additional Data on Construction of Absorber and Actifier Units, Tower Packing, Disposal of Actifier Air and Plant Operation

BY E. H. BIRD
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LIQUID purification of gas by the sodium carbonate process has been in operation in this country since August, 1920. Six plants are in operation at the present writing and twelve others are under construction. Some progress has been made within the last year on new features and applications of the process and operation of the various plants has given us other information of value. The purpose of this paper is to cite briefly such progress and to give operating records and information on some of the present installations. Earlier papers have described the process and discussed its advantages, so there is no need for repetition.

ABSORBER AND ACTIFIER UNITS

The absorber and actifier are usually built in one tower, the absorber being placed above and entirely separated from the actifier by a horizontal diaphragm through the shell. The gas enters the lower part of the absorber section and passes upward, meeting the downward flow of soda solution. The fouled solution leaves the base of the absorber section and flows by gravity to the actifier sprays in the top of the actifier section. The fouled solution is then purified by the upward flow of air in this section. These combined units are built in sizes up to that required for treating 12,000,000 cu.ft. of gas daily.

Where a plant is desired to treat both water gas and coal gas without mixing these gases for purification, a unit can be erected with a vertically divided absorber, one half to treat coal gas and the other half water gas. The solution leaving the absorbers combines and is purified together in the actifier below. This allows the use of a single tower with only one pump and fan for treating both gases. The solution lines going to the absorber section are separate with an orifice on each, allowing the use of the proper amount of solution in each section.

POWER REQUIRED FOR PUMPS AND FANS

With electric current, the power required for the pump and fan is approximately 75 kw.-hr. per million cu.ft. of gas per day, based on the rated capacity of the apparatus. If the volume treated is only half that of the capacity of the apparatus, the pump and fan power can be cut about 25 per cent by cutting down the rates of flow. If the gas volume is increased, the total power for the day of course remains the same.

If spiral ring or hurdle packing is used, the power for the fan can be reduced about 50 per cent, cutting the total power required to about 60 kw.-hr. per million cu.ft. per day.

*Presented before the Illinois Gas Association, nineteenth annual meeting, Hotel Sherman, Chicago, March 15, 1923.

At extra expense, special fans and pumps can be installed requiring about 15 per cent less power than the usual equipment.

With turbine driven pumps and fans, the power consumption at full capacity is 2 to 3 tons per million cu.ft. of gas per day, depending on the size of turbines necessary.

Experimental work in complete liquid purification is being continued and has already been developed to the point where we have purified 5,000,000 cu.ft. of coal gas per day completely by the liquid process. This was continued daily for a period of 2 months at the Seaboard By-Product Coke Co.'s plant. The work now being done will determine only the best type of equipment for this work. That complete liquid purification is possible and also feasible is a certainty.

PACKING FOR THE TOWER

There are now in operation towers packed with three types of packing—namely, coke, wooden hurdles and spiral rings. The advantages and disadvantages of these various kinds of packing appear to be as follows:

COKE:

1. Low cost.
2. Large surface requiring the use of the smallest volume of packing.
3. Highest back pressure. The towers are, however, made large enough in diameter to give a back-pressure of less than 1 in. of water in absorber and 3 in. in actifier when packing is clean.
4. A disadvantage is that the coke may have to be removed and replaced. The back pressure in the actifier may rise to a point where it will reduce the volume of air from the fan. This point has not been proved as yet. At Rochester, the pressure in front of the fan rose from 3 to nearly 4 in. of water during 6 months' operation. Investigation disclosed, however, that the back pressure was caused by a deposit of sodium bicarbonate which had formed on a 4 to 5 in. layer of coke in the top of the actifier. Washing with hot water reduced the back pressure to the original value of between 2.5 and 3 in. At this plant saturated solution of bicarbonate entered the actifier. On evaporation this deposit resulted, which has not re-occurred. The back pressure in the absorber is very low (about ½ in.), which allows a larger increase than in the actifier.
5. The absorber section may clog with tar and naphthalene and require more frequent steaming than with other packing.

WOODEN HURDLES:

1. High cost, although not as high as spiral rings.
2. Larger volume of packing required.

3. Lower back pressure than coke.

SPIRAL RINGS:

1. The most expensive packing. Their use will increase the cost of the plant 25 to 35 per cent.
2. Lowest back pressure.
3. Largest percentage free space.
4. Strongest and most permanent.

NATURAL GAS PURIFICATION

Extensive experimental work has recently been completed on the purification of natural gas containing sulphur. This work was done on the natural gas from the Tilbury Field near Chatham, Ont. Gas under a pressure of 125 lb. per sq.in. was successfully treated. The hydrogen sulphide content of the gas treated was about 350 grains per 100 cu.ft. (at atmospheric pressure) and was easily reduced to 20 grains per 100 cu.ft. Since this gas contains practically no organic sulphur, this amount of hydrogen sulphide is permissible. The purified gas was burned in open flame heaters and no offensive odor was noted until the content reached 50 grains per 100 cu.ft.

This gas contained no carbon dioxide. The carbon dioxide believed necessary for the process was supplied by the exhaust from a gas engine, "carbonating" the solution. In a commercial plant, the carbon dioxide contained in the exhaust from the gas engines or boilers, furnishing power for the pumps and fans, would be sufficient for the process. It is also possible that little or no carbon dioxide would be necessary, especially after starting the process.

DISPOSAL OF THE AIR FROM THE ACTIFIER

At certain locations where the plant is situated in a residential or business district, it is not advisable to put out the air from the actifier without dilution of same. Other means of disposing of the air consist of use of the air in boilers, water gas generators or retorts.

At the Rochester plant, where about 6,000,000 cu.ft. of coal gas is being treated daily, the volume of actifier air is 630,000 cu.ft. per hour and contains approximately 140 grains of hydrogen sulphide per 100 cu.ft. This is mixed in a large stack with the air from a ventilating system on the vertical retorts at that plant. This ventilating system and stack were previously installed and it was only necessary to mix the actifier air with it. The air is in this way diluted to a content of approximately 13 grains per 100 cu.ft. or 1 grain in each $7\frac{1}{2}$ cu.ft. of air. This represents the average conditions. On individual days, with high sulphur gas, it is estimated the outlet air has been above 20 grains per 100 cu.ft. This air leaves the stack at a height of about 175 ft. above surrounding buildings. The plant is in the center of a business district, but absolutely no complaints have been had. The odor has never been detected to our knowledge. It is probable that the stack could be considerably lower or the sulphur content of the air higher before any odor was detected.

When it is desired to dilute this air, the stack can be built adjacent to the tower and low pressure ventilating fans installed to accomplish this. Fans to blow against $\frac{1}{4}$ to $\frac{3}{8}$ in. pressure are economical to operate and add only little to the operating cost. In high class buildings or residential districts, it is quite certain that a high stack as well as some dilution is necessary, especially with coal gas. The extent of the equipment necessary also depends on the volume of gas being treated.

At most locations it is either possible to put the actifier air out without dilution or use it in boilers, water gas generators or retorts. At an installation under construction for the Boston Consolidated Gas Co. the present water gas blowers will draw air through the actifier. At another installation for the Consumers Power Co., Flint, Mich., a blower will put air through the actifier and then to the forced draft boiler installation, the blower providing sufficient pressure and volume for both.

OPERATING DATA ON PRESENT PLANTS

Following is a brief outline of operating results (where available) and points of interest about the purification plants already in operation:

Seaboard By-Products Coke Co.'s Plant.—The first liquid purification plant was built for the Seaboard By-Products Coke Co. and was put in operation during August, 1920. This plant was enlarged a year later to one capable of removing 90 per cent of the hydrogen sulphide from 25,000,000 cu.ft. per day, and has been in continuous operation since that time. Operating data for the year 1922 are given in Table I.

At this plant no heating coils have as yet been installed to heat the solution during the winter. Free exhaust steam from the pumps and fans has been used, causing some dilution of the solution. Considerable solution has been thrown away during the winter months. The soda consumption of 0.062 lb. per 1,000 cu.ft. includes this soda. Omitting this, the consumption would be about 0.045 lb. per 1,000 cu.ft.

Battle Creek Gas Co.'s Plant.—The purification unit at this plant has been previously described by F. W. Seymour, manager of this plant, in a paper on liquid purification read before the Michigan Gas Association in September, 1922. The operating data given in Table II are the average of those obtained since the plant started in June, 1922, until Feb. 1, 1923.

The soda consumption at this plant is worthy of note. An average of only 27 lb. of soda ash has been used daily on the purification of 1,405,000 cu.ft. of gas. A Ross heater has recently been installed for heating

TABLE I—OPERATING DATA, SEABOARD BY-PRODUCTS COKE CO.

Gas Treated:	
Total for 1922, cu.ft.	8,563,323,000
Daily average, cu.ft.	23,500,000
Hydrogen sulphide in inlet gas:	
Average, grains per 100 cu.ft.	346
Range of monthly averages, grains per 100 cu.ft.	228 to 534
Maximum on individual tests, grains per 100 cu.ft.	800
Hydrogen sulphide in outlet gas:	
Average, grains per 100 cu.ft.	31
Hydrogen sulphide removed:	
Per cent	91
Total for year, lb.	3,858,090
Per lb. soda, lb.	7.24
Soda ash used:	
Total, lb.	532,800
Per 1,000 cu.ft. (including overflow), lb.	0.062

TABLE II—OPERATING DATA, BATTLE CREEK GAS CO.

Gas Treated:	
Average, cu.ft. per week	9,840,000
Maximum, cu.ft. per week	11,521,000
Minimum, cu.ft. per week	8,559,000
Hydrogen sulphide in inlet gas:	
Average, grains per 100 cu.ft.	311
Maximum weekly average, grains per 100 cu.ft.	449
Minimum weekly average, grains per 100 cu.ft.	196
Hydrogen sulphide in outlet gas:	
Average, grains per 100 cu.ft.	34
Maximum weekly average, grains per 100 cu.ft.	66
Minimum weekly average, grains per 100 cu.ft.	18
Average removal of hydrogen sulphide, per cent	89.1
Soda ash used:	
Average per week, lb.	186
Average per day, lb.	27
Average per 1,000 cu.ft., lb.	0.0188
Hydrogen sulphide removed per lb. soda ash, lb.	35.8
Solution circulated per 1,000 cu.ft., gal.	59
Air used per gal. of solution	72

the solution going to the absorber during the cold weather.

Rochester Gas & Electric Co.'s Plant.—This installation was the first supplied with coke packing. It was built for a removal of 90 per cent of hydrogen sulphide from 6,000,000 cu.ft. of gas per day, but has been found on actual operation since September, 1922, to have removed approximately 75 per cent of the hydrogen sulphide from the gas treated. The average gas treated daily in the Rochester plant has been approximately 5,800,000 cu.ft.

This equipment will be enlarged this spring to bring it up to the capacity for which it was originally intended. Other similar towers under construction have 50 per cent more tower packing in both absorber and actifier in proportion to the gas to be treated.

Wisconsin Gas & Electric Co.'s Plant.—A license for the use of this purification process was granted this company and it purchased and installed its own equipment.

Considerable trouble was had with the disposal of the air from the actifier at this plant. A very high sulphur gas was treated and the air was put out without dilution. The plant is located about two blocks from the main business street and the yard level of the plant is considerably below this. A short wooden stack with temporary dilution fans was later installed, but it was found that a high stack as well as good dilution of the air would likely be necessary to correct this difficulty. It was entirely possible and feasible to use this air in the boilers, and this was done temporarily. It was also possible to use this air as air supply in heating the retort benches, and this method will probably be the permanent means for disposal of this air.

Pacific Gas & Electric Co.'s Plant.—The first of five plants under construction for purification of oil gas for the Pacific Gas & Electric will be ready to start about March 1 of this year.

Indiana Coke & Gas Co.'s Plant.—A tower formerly used for benzol recovery was adapted to liquid purification and put into operation the middle of February of this year. The tower was divided into an absorber and an actifier section and filled with wooden hurdles. The tower is 10 ft. in diameter and has 12½ ft. of wooden hurdles in the absorber section and 18½ ft. of hurdles in the actifier section. The plant has just been started and only preliminary results are available. The last report, however, shows that it is removing 93 per cent of the hydrogen sulphide from approximately 1,500,000 cu.ft. of coal gas per day.

Waste Heat From Cement Kilns Operates Entire Mill

With Efficient Prime Movers and Grinding Equipment, the Entire Cement Plant May Be Operated on Power From Waste Heat Boilers

By H. A. Schaffer
Conservation Engineer, Portland Cement Association

THE UTILIZATION of the heat in the gases escaping from rotary kilns to generate steam with which to operate the entire plant probably marks the greatest improvement in equipment of portland cement factories in recent years, for it is during the past 6 years that waste heat boilers have been installed on a large scale in these plants.

The application of the idea is by no means a new development. When the original portland cement plant in the Nazareth district (Pennsylvania) was designed in 1897, Dr. Irving A. Bachman conceived the idea of generating a portion of the steam required to operate the plant from the heat in the kiln gases which, up to that time, were allowed to escape through stacks into the atmosphere.

Dr. Bachman placed the boiler immediately over the rear kiln housing so that the dust laden gases entered the first pass in the boiler directly after leaving the kiln, with no intervening flue to collect even a portion of the dust. It was found impossible to keep the boiler clean under these conditions; furthermore, natural draft was the only means of drawing gases through the kiln and boiler and the dust accumulated so rapidly that continuous operation of the kiln was not possible. The result was that the original waste heat boiler was soon abandoned.

The late Prof. R. C. Carpenter, of Cornell University, was another pioneer who took a prominent part in the development of the waste heat boiler. Several years after Dr. Bachman's experiment, Prof. Carpenter installed a waste heat boiler to receive the hot gases from one of the rotary kilns in the Cayuga plant at Portland Point, New York. Some very interesting tests were made on this boiler while the tubes and gas passages were clean and the results were published in the trade journals. At this place, however, ample flue connections were not provided for the removal of a large percentage of the dust between the upper end of the kiln and the boiler. The same general result obtained at Nazareth was experienced in the Cayuga plant, although the company struggled for a long period to handle the dust before finally abandoning the waste heat boiler.

It will therefore, be seen that the early endeavors to utilize successfully the heat in the kiln exit-gases showed the necessity for precipitation and removing much of the dust before these gases entered the boiler.

Profiting by these early experiences, the next waste heat boiler in the cement industry was somewhat removed from the upper end of the kiln with a substantial flue constructed between the kilns and the boilers. Economizers were placed after the boilers and an induced draft fan after the economizers. Another feature of this installation was the provision for firing the boilers by hand when the kilns were not operating.

In comparison with present efficiencies this installation did not show up very well, but when it is considered that the plant was designed in 1903 and is still operating and developing approximately one-half of the steam required to operate the entire plant, the results are quite creditable.

We also find that some of the earlier installations were designed and constructed without giving proper consideration to air leakage, this condition prevailing both at the kiln openings and boiler settings. Little or no importance was attached to the infiltration of cold air at the upper or rear end of the kiln.

Regulation and control of draft, another important factor in obtaining maximum efficiency in kiln and waste heat equipment, were also partially neglected, which is another reason the early waste heat boilers in the cement industry failed to show the results of performance attained with present-day equipment.

The modern waste heat boilers are closely connected to the kilns. Air seals are placed on the upper end of the kiln shell to exclude the cold air at this point. All clean-out doors on dust chambers, flues, and at the bottom of each pass in the boilers are tight fitting and in many places are protected with a plastic clay mixture at the joints which is renewed each time the dust is removed. Great care is also used in the construction of the boiler settings, to make them airtight.

Changes in Design Beneficial

Probably the higher percentage of rating developed and over-all efficiency of the boilers installed during the past 6 years over the older equipment are due principally to changes in the design of the boilers utilizing waste gases from cement kilns. Further study and experimentation showed that the rate at which heat is transferred from low-temperature kiln gases to the metal surface of boiler tubes increases as the velocity of the gas increases. Furthermore, if this velocity were increased three times, the heating surface could be reduced one half. It was, therefore, found that instead of a boiler with more than 20 sq.ft. of heating surface for each boiler-horsepower generated, one with 10 sq.ft. of water heating surface would suffice. Lengthening of the gas passages was also found to increase the efficiency of boilers for this purpose. This is best accomplished by rearrangement of the baffle walls in the standard boilers.

One other reason for higher efficiency in the modern waste heat systems in cement plants is the scientific control which is exercised in the handling of the entire system. Analysis of the waste gases is made at regular intervals throughout the day. Hourly readings are recorded of the draft at various points throughout the system. Steam and water flowmeters show the amount of water used, and pyrometers and recording thermometers are also installed for the purpose of recording the gas, water and steam temperatures throughout the entire system.

Some Installations Produce 100 Per Cent of the Power Required

That intelligent regulation and control is a paying proposition from the front end of the kiln to the fan after the economizers, has been clearly demonstrated in many modern portland cement plants. Probably the one outstanding feature in the development of the waste heat boiler in the cement industry is the fact that quite a number of plants are now producing all of the power required to operate their entire plants in waste heat boilers. This condition prevails not alone in the dry process but during the past year has been shown possible in the wet process of manufacture.

It should be stated, however, that the ability to develop 100 per cent of the power required to operate any cement plant depends largely on the character of the prime movers and to fairly low kilowatt-hours per barrel consumption in the various mill departments. Some of the older plants with old style reciprocating engines or high steam consuming turbines are obliged to operate some auxiliary boilers in addition to their waste heat equipment. There are, however, plants of later design with low steam consuming prime movers and a satisfactory consumption of power in the raw and clinker grinding departments, which are experiencing no trouble at all in generating 100 per cent of their power requirements. It should be borne in mind, however, that in order to effect these savings, which amount to from 30 to 50 lb. of coal per barrel of cement manufactured, large sums of money must be added to the already high investment. As an example, depending upon the size of the cement plant, the cost of the equipment of a modern waste heat plant will vary from $250,000 to $700,000. There are now thirty portland cement factories with waste heat boilers installed. Many other companies have plans under consideration which call for this improvement; undoubtedly the high cost of construction and equipment is causing delay on the part of some companies. However, they all recognize the importance of conserving the heat in the waste gases from their rotary kilns.

Magnesium vs. Iron for Hardening a Complex Aluminum Alloy

An alloy called No. 3 is used to a considerable extent by the U. S. Army Air Service. Its nominal composition is 87:2:10:1 Al:Cu:Zn:Fe. Some work has been done recently by Messrs. Dix and Lyon at McCook Field to determine whether the iron in this alloy could be replaced by small amounts of magnesium. (See Air Service Information Circular 393.) It was concluded that the use of magnesium in place of iron in aluminum alloy No. 3 is not advisable. An equal tensile strength in the "as cast" condition may be obtained with the addition of from 0.25 to 1 per cent magnesium in place of the iron, but the percentage elongation is reduced more than half. The hardness values (500 kg.) are appreciably higher.

The best results were obtained with 0.5 per cent added magnesium, while with more than 1 per cent both tensile strength and elongation fall off very rapidly.

A comparison of the effects of 0.5 per cent magnesium and 1 per cent added iron on the average physical properties follows (alloys as cast):

Alloy	Composition Cu	Zn	Mg	Fe	Al	Tensile Strength Lb. Per Sq.In.	Elongation In 2 In. (Per Cent)	Brinell Hardness
M-½	2.00	10.00	0.50	....	87.50	27,330	1.4	65.0
No. 3	2.00	10.00	....	1.00	87.00	26,000	5.0	52.4

The following physical properties were obtained from alloy M-½:

No. of Bars	Condition	Tensile Strength	Elongation In 2 In.	Brinell	Rockwell	Scleroscope	Sp.Gr.	Shrinkage (In. per Ft.)
6	*A*	27,330	1.40	65	50	19	2.87	0.1049
3	*B*	26,390	1.80	63	54	17	2.86	....
3	*C*	25,310	1.00	70	53	18	2.85	....
3	*D*	28,440	1.50	67	57	25	2.85	....
3	*E*	31,120	1.00	74	60	28	2.87	....
3	*F*	31,670	1.17	77	62	29	2.86	....
3	*G*	35,680	.83	80	62	31	2.86	....

Condition *A* is as cast. *B* is remelted *A*. *C* is *A* after machining. *D* is *B* after 30 days' aging. *E* was furnace cooled after 3 hours at 920 deg. F. *F* was quenched in water at 70 deg. F. *G* was quenched and held in boiling water for 3 hours.

Alloys were made in 30-lb. melts by charging aluminum ingot and copper-aluminum hardener in a No. 30 plumbago crucible, and melting a gas-fire furnace. The maximum temperature was held between 1,300 and 1,350 deg. F. Zinc was then introduced in the solid form and the pot drawn from the furnace, after which stick magnesium was introduced by holding it beneath the surface of the molten metal until dissolved. No trouble was experienced from the magnesium igniting as long as the latter operation was performed quickly. The pouring temperature ranged from 1,270 to 1,300 deg. F., the temperatures being recorded at all times with a chromel-alumel thermocouple without protecting tube.

Metering Viscous Fluids*

Measurement of the Flow of Oils With the Venturi Meter, Giving a Method of Calibration and the Limits of Accuracy

By Ed. S. Smith, Jr.
Los Angeles, California

THE venturi meter furnishes a means for accurately measuring the flow of liquids and gases in pipe lines within certain limits. These limits, however, must be known, and they are determined by the corresponding values of the turbulence, also known as Reynolds' criterion and defined by the method of dimensions as Qg/du.

In order to use the venturi meter with accuracy there must be known not only the size and form of the tube but also the viscosity and density of the fluid. There are several standard viscosimeters in common use in the oil industry which are used to determine the viscosity of liquids with commercial speed and sufficient precision to fill all ordinary industrial needs.

The flow of fluids is often the basic problem of an industrial process. Almost as often the amount flowing must be measured. The principles established in this article for oil can readily be applied to other similar fluids. The calibration curves given for the two types of venturi in common use are of value, and the method of calibration outlined can also be used for thin-plate orifice and fixed pitot-tube meters. This paper should be a real help in solving many everyday problems.

The values of the coefficient of the venturi meter have been determined for a wide range of turbulences. The coefficient approaches unity at high turbulences, but drops rapidly just above the upper critical turbulence and approaches zero as the turbulence approaches zero. This falling off of the coefficient is due chiefly to the increase of the friction pressure loss of the tube relative to the theoretical pressure drop.

Fig. 3 is an example of the most convenient form of calibration for actual use, and is the result of 2 years' use of this method of calibrating the venturi meter with viscous oils.

Calibration by the Method of Dimensions

The increasing use of continuous processes in the oil-refining and other industries is bringing the venturi and other continuous flow meters into common use for the measurement of a large variety of fluids. As the viscosity of liquids may now be commercially determined, it is possible to use these meters with a method of calibration which is both simple and exact.

The method of dimensions has been in use for several years in the computation of friction pressure loss in pipe lines carrying viscous oils.

The calibration has been extended to low values of the turbulence by employing data obtained by the author in tests conducted on a model venturi meter at the University of California.

The symbols and formulas used are as follows:

Q = quantity, U.S. gal. per min.
q = quantity, cu.ft. per sec.
u/g = kinematic viscosity, sq.cm. per sec.
u = absolute viscosity, grams per cm.-sec.
g = density (specific gravity, approximately), grams per c.c.
d = diameter of pipe—i.e., the same as the approach to the venturi tube, in.
a = cross-sectional area of pipe, sq.ft.
H = differential head of liquid in venturi tube from the approach to the throat, ft.
h = differential head of mercury in manometer measuring H, in.
C = coefficient for the venturi meter, see equation (1).
P = friction pressure loss in pipe line per 1,000 lin.ft., lb. per sq.in.
k = coefficient for friction pressure loss in pipe line, see equation (2).

$$q = C \times a_2 \times \frac{a_1}{\sqrt{a_1^2 - a_2^2}} \times \sqrt{2 \times 32.2 \times H} \qquad (1)$$

$$P = k \times g \times \frac{Q^2}{d^5} \qquad (2)$$

Fig. 1 shows the value of the venturi-meter coefficient C as determined by actual experiments over a range of turbulence from 0.0003 to 200,000.

The friction-pressure-loss coefficient for pipe lines is also shown, the lower critical turbulence a occurring at 64 and the higher critical turbulence b at 85. From zero to 64 the flow is known as "viscous" or "streamline" flow, and the friction loss varies as the first power of the velocity. From 64 to 85 the flow may be termed "superturbulent," as the friction pressure loss varies as the cube of the velocity. From 85 to infinity the flow is known as "turbulent" or "hydraulic," and the friction pressure loss varies as a power of the velocity (the 1.75 power for smooth steel pipe lines such as are ordinarily used for oil transportation), with the square of the velocity as the upper limit for very rough pipe.

As the coefficient of the venturi meter is partly dependent upon the friction pressure loss along the venturi tube, it is apparent that the law of variation of the coefficient with the turbulence will not be the same for the three types of flow and that consequently the graphical method of handling the coefficient is preferable to the use of an algebraic formula.

Fig. 2 provides an accurate calibration for the two types of venturi meters in common use in the United States, the Builders Iron Foundry and the Simplex Standard.

The Builders Iron Foundry tube has faired lines and consequently the higher coefficient. This calibration is for meters having a ratio of approach diameter to throat diameter of approximately 2.5 to 1, and is strictly correct for a 6-in. meter only—larger sizes having slightly higher coefficients and smaller sizes slightly lower co-

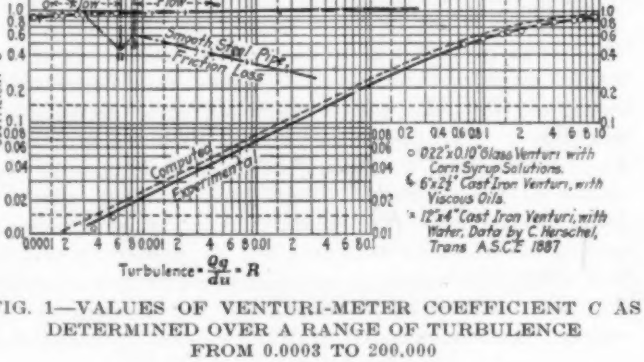


FIG. 1—VALUES OF VENTURI-METER COEFFICIENT C AS DETERMINED OVER A RANGE OF TURBULENCE FROM 0.0003 TO 200,000

*Presented at the Pacific Coast regional meeting of the American Society of Mechanical Engineers, Los Angeles, Calif., abstracted from *Mechanical Engineering* for May, 1923.

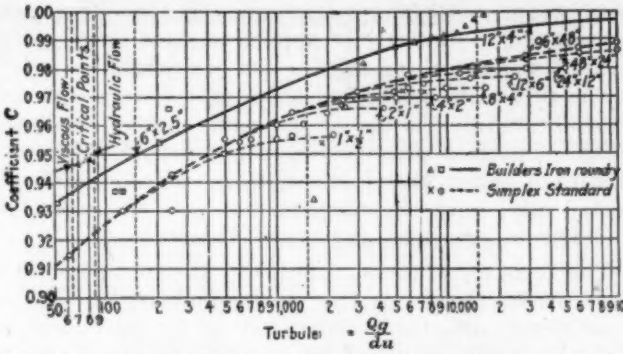


FIG. 2—CALIBRATION FOR TWO TYPES OF VENTURI METERS IN COMMON USE IN THE UNITED STATES

Example in the Use of Fig. 2. Determine the quantity of oil flowing at 130 deg. F. through a 6x2½-in. venturi tube (Type B.I.F.) when the mercury-oil differential h = 4.2 in., the kinematic viscosity u/g = 0.11 sq.cm. per sec. (from 64 sec. Saybolt), the density of the oil flowing is g = 0.90 gram per c.c. (from 26 deg. Bé.) and the density of the same oil at 60 deg. F. above the mercury in the manometer is 0.94 gram per c.c. (from 20 deg. Bé. at this temperature).

Since d_1 = 6 in., a_1 = 0.196 sq.ft.; also, from d_2 = 2½ in., a_2 = 0.0341 sq.ft. Substituting these volumes in equation (1),

$$q = C \times 0.0341 \times 1.016 \times 8.02 \times \sqrt{H}$$
$$= C \times 0.278 \times \sqrt{H} \text{ cu.ft. per sce.}$$

For a first approximation, assume $C = 0.95$; then

$$Q = 448.9 \times 0.95 \times 0.278 \times \sqrt{\frac{13.6 - 0.94}{12 \times 0.90}} \times \sqrt{4.2}$$
$$= 263 \text{ gal. per min.}$$

therefore

$$\text{But } Qg/du = \frac{263}{6 \times 0.11} = 400, \text{ and from Fig. 2, C} = 0.962;$$
$$Q = 0.962 \times 278 = 267 \text{ gal. per min.}$$

which is the quantity flowing under the conditions stated above.

efficients. However, it is accurate enough for oil measurement under commercial conditions.

The Simplex Standard tube has a ratio of diameters of 2 to 1, and all sizes are made closely similar in form. The sharper changes from the cylinders of the approach and throat to the cone cause the coefficient to be slightly lower than for the other type of meter, but its accuracy is as high since it is necessary with both types of meter to use a calibration when measuring viscous oils.

Fig. 3 consists of *Q-h* curves for each of several viscosities of oil. The full lines are accurate to 1 per cent. The broken lines are in the viscous-flow region and are of undetermined reliability. The density correction for the head h is applied by the graph at the left side of the figure. A graph for the conversion of Baumé density to specific gravity (density in grams per c.c.) is attached to the upper side of the density-correction graph and shows the correction for the increase of density with a rise of temperature of the oil above 60 deg. F. At the right of the density-temperature graph is a small sheet of logarithmic cross-section paper for plotting viscosities at various temperatures of the oil which is being measured. The kinematic viscosity of ordinary petroleum oils, when plotted against temperature on logarithmic cross-section paper, forms a nearly straight line. As an example three plotted points are shown for a viscous California oil. At some higher temperature than 200 deg. F. this line is discontinued for most petroleum oils and another nearly straight line holds for higher temperatures. The conversion from Saybolt viscosity to kinematic viscosity is given on the upper margin of this graph. The viscosity of oil at any temperature, as shown on this graph, is used to indicate the proper curve to use on the *Q-h* graph. This same group of auxiliary graphs may be used with any size of venturi meter, it being necessary to change only the *Q-h* graph.

The data submitted in Fig. 2 for the Builders Iron Foundry venturi tube are accurate to within 1 per cent for tubes of similar form (2.5:1 ratio of approach to throat diameter) for 2-in. to 12-in. diameter tubes in the region of turbulent flow, since the data in this region are calibrations of full-size venturi tubes with lathe-turned bronze or cast-iron throats.

This calibration applies strictly to 6-in. diameter tubes only; because the tubes to be similar in form must have the roughness increase directly with the size of the tube—i.e., the size of the rugosities must be in proportion to the diameter of the tube. The use of equally rough (or smooth) surfaces for all sizes of meters causes the coefficient to be slightly higher for larger meters for all turbulences in the region of turbulent flow. The degree of roughness does not appreciably affect the coefficient of the venturi tube in the viscous-flow region.

The data in the viscous-flow region are not as accurate as those in the turbulent-flow region. The for-

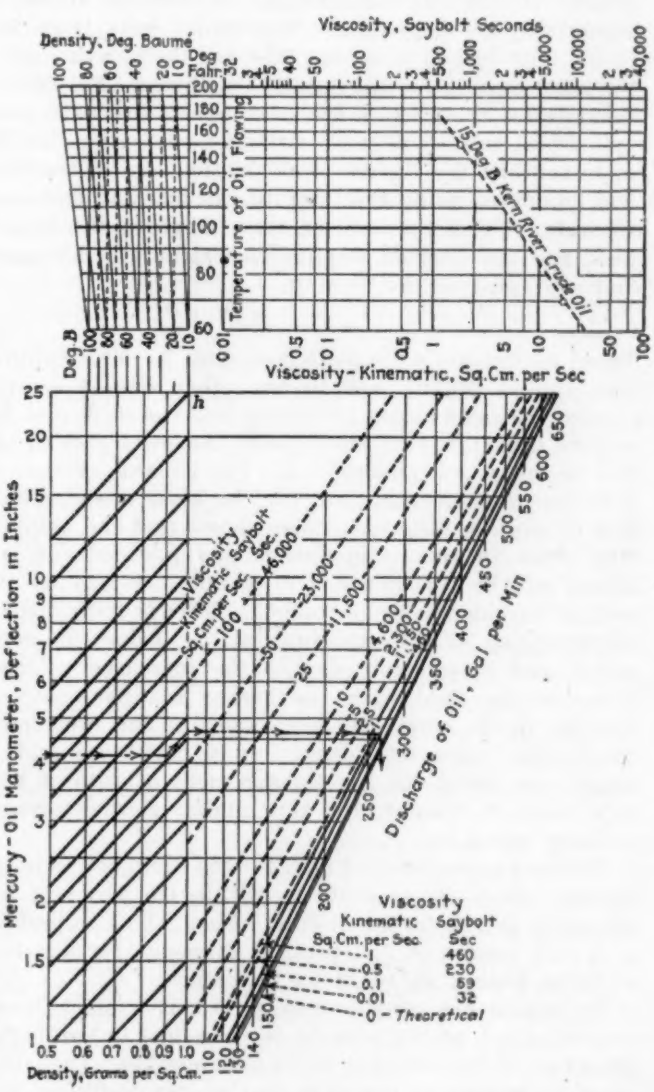


FIG. 3—FLOW GRAPH FOR A 6x2½-in. BUILDERS IRON FOUNDRY VENTURI METER

Example in the Use of Fig. 3. Determine the quantity of oil flowing under the same conditions as in the example illustrating the use of Fig. 2.

Referring to Fig. 3, follow the arrowed dot-and-dash line for the 4.2-in. mercury-oil deflection from the left side of the density-head diagram to the 0.90 vertical density line, then up the diagonal to the corrected deflection h = 4.68 in. Follow this horizontal dot-and-dash line to its intersection with the diagonal 0.11 kinematic viscosity line (obtained by interpolation). Reading vertically down from this intersection it is seen that the quantity of oil flowing under these conditions is 267 gal. per min.

mer are from a calibration made by the author on a 0.22x0.10-in. home-made model glass venturi-meter tube with water and corn-sirup solutions. The venturi tube was drawn from a straight glass tube and, while not exactly similar in form to the Builders Iron Foundry tubes, approached it closely enough to show definitely the type of variation of the coefficient to be expected for full-scale venturi tubes. The kinematic viscosity was determined with home-made pipette viscosimeters calibrated with water. In spite of the care used to avoid the effects of surface tension and velocity head, and because these viscosimeters measured solutions more than a thousand times as viscous as water, the probable accuracy of the viscosity determinations is approximately 90 per cent. This would mean an expected error of about 10 per cent in the turbulence for the values of the coefficient in the viscous-flow region.

For the purpose of checking the viscous-flow data obtained with the model glass venturi tube, the theoretical coefficient of a 6x3-in. Simplex venturi tube was computed. It was assumed that the only sources of loss of head from the approach to the throat were those due to the friction loss along the tube and the building up of the kinetic energy of the fluid in the throat. Poiseuille's formula for the friction loss of fluids in viscous flow in cylindrical tubes was used without modification for the approach and the throat. The friction loss in the cone was computed using the integral calculus and the same formula. From the sum of the change in the kinetic head and the friction loss the coefficient was computed and expressed by the formula—

$$C = 1/\sqrt{1} + (1.67/R)$$

These coefficients were plotted on Fig. 1. This calibration applies equally well to any other size of venturi tube of the same shape. It shows that the coefficient decreases indefinitely as the slope of the lower part of the line becomes the constant 0.5. The general agreement with the experimental data for the glass model, which was of slightly different shape, shows that the assumption made in this computation was justified for low values of the turbulence, but is not sufficient as the critical turbulence is approached. This is indicated by the dropping of the experimental line below the computed, and is probably due to the increased internal losses in the fluid with the higher readjustments of velocity in the cone. At low values of the turbulence the venturi tube acts merely as a resistance and is exactly as useful for the measurement of rate of flow as a piece of straight pipe with similar piezometer connections would be.

The data presented in Fig. 2 for the Simplex Standard venturi tubes are accurate to within 0.5 per cent for all values in the turbulent-flow region. This calbration is for all meters of 2:1 ratio of diameter for all sizes of tubes from 1 in. to 48 in. in diameter.

As liquids are usually transported at a much lower velocity (s) than the velocity (c) of sound in the liquid, the effect of the compressibility is negligible. The effect upon the venturi or pipe-line friction-loss coefficient due to the compressibility of the liquid flowing is found to be a function of s/c by the method of dimensions. When, as is frequently the case, gases and vapors are handled at the acoustic velocity (c) or higher, the coefficients must be considered as functions of s/c as well as of Qg/du. Experimental data compiled on a graph according to this method would provide a rational calibration of venturi, orifice, and pitot meters for use with steam and high-pressure gas or air. This same method might similarly be applied to show the performance of steam-turbine nozzles and jet pumps.

The thin-plate orifice and fixed pitot-tube meters may be calibrated by the use of this same method of dimensions. The fixed pitot tube is very sensitive to irregularities of flow in the viscous-flow region, especially with heated oils; however, experimental data are necessary to determine its value and range of usefulness.

The accuracy of measurements by the venturi or thin-plate orifice meters in the viscous-flow region may be considerably affected by heated oil or by valves and fittings near the venturi tube or orifice plate, especially when the fittings are located on the upstream side. The amount of error due to these causes can be determined only by experiment.

The thin-plate orifice meter is less affected by the viscosity than the venturi meter at the lowest turbulences that are ordinarily used in practice; consequently the orifice is more suitable for use with fairly viscous liquids than is the venturi meter.

Utilizing Your Old Firebrick

The life of furnace walls made of refractory material may be greatly extended at a very slight cost by means of a method developed by James A. Faulkner of Cleveland, Ohio, recently noted in *Power*.

According to this method old firebrick are first ground to a fine powder. Small amounts of high-grade fireclay and ground silica are then mixed in to form a binder. A mortar is made of this mixture. This makes a good mortar for laying up a new wall. In connection with an old furnace, the wall is coated with a layer of this material from ¼ to ½ in. thick. With boilers operated at high rating, this layer is renewed every 30 days or as often as may be necessary, and the wall maintained indefinitely. At least twice the ordinary life of the brick is obtained in this way.

In repairing furnace walls, arches and monolithic work in general, the first operation is to fill up the spalled portions with coarsely ground firebrick made plastic by the addition of water. After bringing the wall back to its original thickness in this way, it is coated with cement solution with either a trowel or cement gun. This cement solution is used to bind the mortar to the brick surface. Esso Bond No. 35 or No. 32 fine cement is used to do this work. The mortar itself is prepared by grinding brickbat in such a mixing and grinding machine as the putty chaser. A bonding clay with a fusing point around 3,100 deg. F. is added, along with a small amount of finely ground silica ganister. For making the material plastic, sodium silicate is used. The one item of expense in using this method, which is practically unavoidable, is the installation of a mixing and grinding machine. No other means is available for bringing about the intimate mixture of the ingredients of the mortar that is necessary to a successful application. However, where there is much repairing to be done, this method has much to recommend it, since the cost of maintaining furnace walls in this manner is only a fraction of that which is necessary when they are entirely rebuilt at frequent intervals as is common practice in many places.

Plants using this method most successfully repair at frequent periodic intervals of possibly 30 days, whether any extreme need for repair is discovered or not.

Legal Notes

By Wellington Gustin
Of the Chicago Bar

Keeping Process Secret

Supreme Court Holds This Constitutes Abandonment of Claims to Patent

An interesting point to inventors and owners of secret processes is involved in a suit by the Victor Talking Machine Co. against the Starr Piano Co., involving the Johnson patent, No. 896,059, for the disk sound record for talking machines, owned by the former company (43 Supreme Court).

Under advice of counsel, Johnson for years relied upon keeping his process secret. The court held that the authorities were clear that keeping a process secret for years by the inventor constitutes abandonment under the patent laws. (Macbeth-Evans Glass Co. vs. General Electric Co., 246 Federal 695.)

Decree was for the defendant, and the Johnson patent, claims 6 and 8, was held void for lack of invention and for abandonment under the patent laws.

Law of Unfair Competition

Court Upholds Trade Commission's Order That Royal Baking Powder Co. Cease Misrepresentation of Its Own Product

An interesting question on unfair competition is involved in the matter of the Royal Baking Powder Co. versus the Federal Trade Commission before the U. S. Circuit Court of Appeals. (281 Federal 747.)

For more than 60 years Dr. Price's Cream Baking Powder had been marketed and advertised extensively as a cream of tartar product, the advertising being designed to establish in the minds of the consumers the superiority of this powder, particularly from the point of view of healthfulness over powders containing phosphate of alum. In July, 1919, because of the scarcity and high price of cream of tartar, the company changed Dr. Price's Cream Baking Powder to a phosphate powder, and although the change was announced in a news item for the trade papers, the new labels bore such resemblance to the old ones and the subsequent advertising was of such a nature that the Federal Trade Commission issued an order for the company to cease and desist from:

"1. Using on the new phosphate baking powder manufactured by it the so-called overprint label or the so-called new label heretofore used by it, or any label simulating or resembling in coloration, design or general appearance the labels formerly used by respondent on its 'Dr. Price's' brand of cream of tartar baking powder.

"2. Selling, or advertising for sale, said phosphate baking powder under the name 'Dr. Price's' or 'Price's' unless the word 'cream' is omitted and the word 'phosphate' is incorporated as part of the name of said baking powder, on the labels thereof and in the advertisements relating thereto.

"3. Advertising or representing, in connection with the sale of said phosphate baking powder, that respondent's 'Dr. Price's' cream of tartar brand of baking powder has been reduced in price.

"4. Representing, by advertising or otherwise, that said phosphate baking powder is the baking powder sold by respondent 'company' for many years under its Dr. Price's brand."

The Circuit Court of Appeals of the United States said it was satisfied from an examination of the evidence that the commission's findings were amply justified. Then the question presented was whether the order quoted above was valid.

Company Contends That Misrepresentation of Own Product Is Not Unfair

The company contended that misrepresentation of the quality or ingredients of one's own goods is not "an unfair method of competition," within the meaning of the federal trade commission act. Counsel argued that no statute or decided case has declared that a manufacturer or trader owes to his competitors the duty of refraining from misrepresentation of the quality or ingredients of his own goods, and that, on the contrary, it has been held that no such duty exists, and it was said that in making the order above set forth the commission assumed not only to create a new rule of substantive law but to destroy one of long standing and of universal acceptance. Several cases were cited in support of this contention.

The outstanding case in support is that of the American Washboard Co. vs. Saginaw Manufacturing Co., 103 Federal 281. In this case the complainant was the manufacturer of a washboard having the rubbing face made of aluminum and upon which it used the word "Aluminum" as a trade-mark. It was the only manufacturer of such boards in the country, having secured a monopoly of all the sheet aluminum produced which was suitable for use in their manufacture. The bill filed in the case, which asked for an injunction, alleged that the defendant had placed on the market a washboard on which it used the word "Aluminum," by reason of which the public was deceived into buying it as a genuine aluminum washboard, although there was none of that metal in its composition.

Why Federal Commission Was Created

The U. S. Court of Appeals, then composed of Judges Taft, Lurton and Day, each of whom later became a member of the U. S. Supreme Court, held that the facts alleged did not entitle the complainant to relief, since it was not shown that purchasers bought defendants' boards in the belief that they were made by complainant.

Commenting on this and similar cases the Court of Appeals in the Baking Powder Co. case says the above case illustrates one of the reasons which led Congress to enact the statute creating the Federal Trade Commission and making unfair methods of competition unlawful and empowering the commission to put an end to them. Before the federal trade commission act became law the courts appear to have had jurisdiction of an action of unfair competition only when the property right of the complainant had been invaded. But the act gave authority to the commission itself when it had reason to believe that any person, partnership or corporation was using any unfair method of competition in commerce, if it appeared to it that a proceeding "would be to the interest of the public," to bring such offending party before it to answer and to require it to cease and desist from its unlawful methods.

Therefore the commission's order was upheld

Machinery
and Appliances
for Production and Control

Equipment News

From Maker and User

Materials
and Accessories
for Chemical Industries

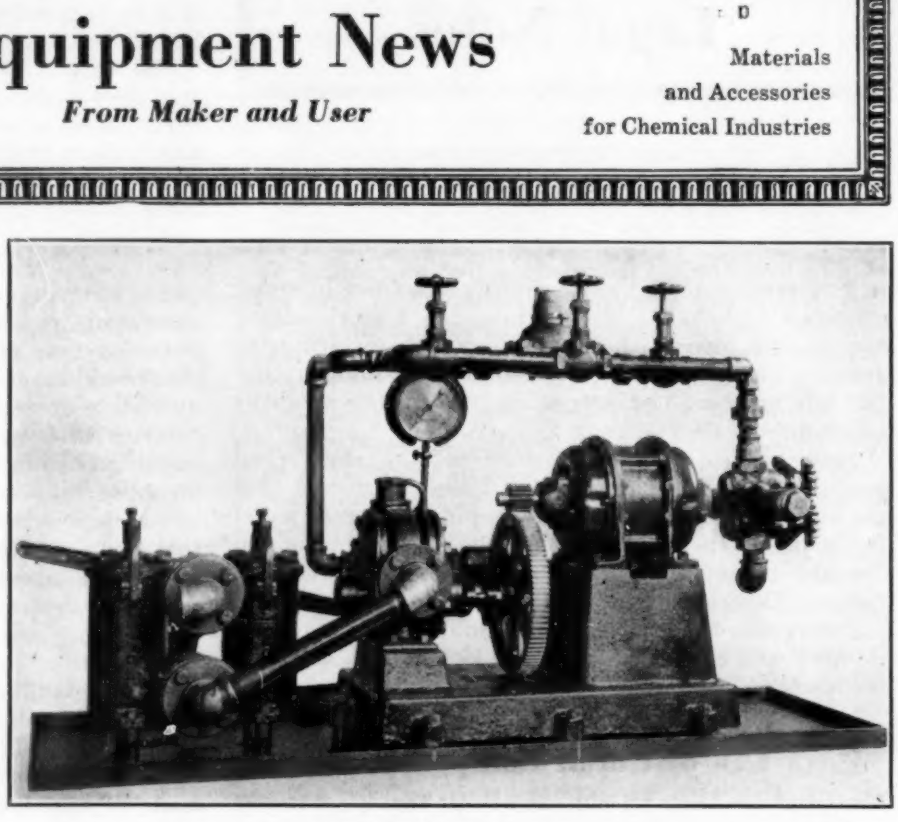
Positive Gear Pump for Viscous Liquids

Recently the Schutte & Koerting Co., of Philadelphia, Pa., has placed on the American market a positive pump of German design that has already (during the past 6 months) achieved a position of much popularity in plants using this type of equipment. Uses to date have been for pumping oil, tar, collodion, sulphuric acid and other materials of a similar nature.

This pump, made in capacity ranging from 5½ gal. per minute to 140 gal. per minute and operating at pressures from 150 to 250 lb. per sq.in., consists of a cycloidal-shaped housing containing two gears—a driving gear and an idler gear. A feature of this pump is the holes drilled through the idler gear at the root of each tooth, which permit a slight bypassing of the liquid entrained between the teeth and the forcing of this bypassed portion of the liquid through two slots, one leading to bearing surface between the trunnion and the gear and the other to the center of the trunnion. All shock and side pressure are thus eliminated and the bearing surfaces are lubricated by the material being pumped.

The pump is positive in action. Liquid is carried by the gear teeth from the suction to the discharge side. The liquid is discharged under a uniform pressure without shock or vibration. Direct drive, gear drive or belt drive is supplied to fit the installation. The pump shown in the illustration is being used in connection with a duplex oil strainer, and is mounted on the same bedplate with its motor, to which it is gear connected.

This pump is recommended by its makers for use, among other things, in pumping fuel and lubricating oils, oils in refineries, heat-treating plants and machine shops; and for pumping various liquids in sugar refineries, soap plants, paint plants and other plants with a product of a chemical nature such as byproduct coke-oven plants.



KOERTING GEAR PUMP

Non-Corrosive Alloy

The DuPont Engineering Co. is now manufacturing a non-corrosive metal called Everdur No. 50 Metal. This material is furnished in the form of rods, sheets, castings, tubes and other customary shapes. It is a type of bronze so constituted that it is free from the internal difference of electrical potential between ingredients which causes "dezincification" in brasses and disintegration in many types of bronzes.

This metal can be machined easily, and can be welded, soldered or brazed in about the same manner as copper or bronze. It can be cast, rolled, flanged, forged, spun or drawn to any form in which copper can be obtained. This fact, in conjunction with its resistance to a large number of corroding liquids and gases, gives it a wide range of usefulness.

PHYSICAL PROPERTIES

Melting point: 1,050 deg. C., 1,922 deg. F.
Specific gravity: Cast, 8.15. Weight per cu.in., 0.294 lb.
Rolled, 8.45. Weight per cu.in., 0.305 lb.
Shrinkage: $\frac{3}{16}$ to $\frac{1}{4}$ in. per ft. (depending on thickness of section of casting).
Tensile strength:

	Ultimate, Lb. Per Sq. In.	Elastic Limit, Lb. Per Sq. In.	Elongation, in 2 In., Per Cent	Reduction of area, Per Cent
Green sand castings	50,000	30,000	24	35
Forgings	64,000	40,000	54	60
Hot rolled rods	73,000	48,000	56	53
Rolled sheets half hard finished	80,000	56,000	40	..
Cold-drawn tubing (as drawn)	98,000	60,000	16	..
Cold-drawn tubing (normalized)	65,000	31,000	55	..

Hardness: Cast (green sand), scleroscope, universal hammer, 11-12.
Cast (iron molds), scleroscope, universal hammer, 13-14.
Cold-rolled (unannealed), scleroscope, universal hammer, 39-40.
Hot-rolled (unannealed), scleroscope, universal hammer, 19-20.
Hot-rolled (unannealed), Brinell, 119.

Tensile strength ⅞-in. hot-rolled rod at elevated temperatures as determined by U. S. Bureau of Standards:

Temp., Deg. F. ± 80 C.	Ultimate, Lb. Per Sq. In.	Elongation in 2 In. Gage Length, Per Cent	Reduction of Area, Per Cent
80	72,650	43.5	51.0
500	60,200	33.0	67.4
750	35,930	25.5	69.4
1000	14,480	18.0	71.4

Resistivity to Corrosion

For simplicity in calculating the probable life of the metal in service, the corrosion is stated in terms of "*inches penetration per month*" and is calculated from the density of the metal, surface area exposed to the corroding agent and loss in weight during exposure to corrosion for a given time.

On account of the enormous variation in corrosion with the time of exposure of the material to the corroding solution, preliminary corrosion test is made for a period of 48 hours.

This eliminates the effect of initial electrochemical face actions such as overvoltage and the formation of protective coatings. Initial effects of this kind must be neglected if a corrosion factor for use over a long period of time is to be obtained. Therefore the measurements are taken only after the initial 48-hour corrosion period, and the loss in weight for this second period accurately determined. In all cases the data given below are final figures.

Hydrochloric Acid:
Concentrated hydrochloric acid under static conditions at room temperature 0.0012 in. penetration per month.
Concentrated hydrochloric acid, agitated at 200 r.p.m. at room temperature, 0.0025 in. penetration per month.
2 per cent hydrochloric acid at boiling point agitated at 200 r.p.m., 0.00118 in. penetration per month.
In vapor form, boiling concentrated hydrochloric acid, 0.0031 in. penetration per month.

The above corrosion in hydrochloric acid should be qualified as follows: In completely submerged solutions, the above figures are correct. If, however, the action of air and daylight enters as factors, the corrosion is more severe, so much so that it is not advisable to use the metal for open storage tanks for concentrated hydrochloric acid, and probably not for blow cases where it is alternately subjected to the action of the acid and excess of air.

Daylight alone has an effect on the rate of corrosion. Samples of alloy, completely submerged in concentrated hydrochloric acid out of contact with the air, but exposed to the daylight, showed 0.00184 in 8 months. Comparison of this figure with 0.0012 in. penetration the first month as given above indicates that the rate of corrosion falls off rapidly after the first month. A sample submerged in the same acid, out of contact with air and kept in the dark, showed 0.00032 in. penetration in 8 months. This indicates that the metal is satisfactory for pipe lines and pumps in cases where air and daylight are practically excluded.

Chlorine Bleaching Solutions:
Solution of hypochlorous acid containing per liter
30 grams available chlorine.
47 grams calcium chloride.
Corrosion, 0.0051 in. penetration per month.
Solution of hypochlorus acid containing per liter
15 grams available chlorine.
23.5 grams calcium chloride.
500 cc. carbon tetrachloride.
Corrosion 0.0025 in. penetration per month.
Solution of bleaching powder containing per liter
12.5 grams available chlorine.
750 cc. carbon tetrachloride.
Corrosion, 0.0016 in. penetration per month.
Solution of calcium hypochlorite bleach containing per liter 10 grams available chlorine made just acid with hydrochloric acid.
Corrosion, 0.00158 in. penetration per month.
All of the above tests were carried out at 30 deg. C. under conditions of agitation.

Chlorides:
Still residues containing
Calcium chloride ....38 per cent
Water ....50 per cent
Ethyl acetate .... 8 per cent
Ethyl alcohol .... 4 per cent
Corrosion at the boiling point, 0.00031 in. penetration per month.
Calcium chloride solution (135 grams per liter) agitated at 200 r.p.m. at room temperature, 0.00035 in. penetration per month.
Saturated sodium chloride solution, agitated at 200 r.p.m. at room temperature, 0.000006 in. penetration per month.
In the same solution partly submerged and subjected to the alternate action of films of solution and air, 0.00026 in. penetration per month.

Sea Water at 95 deg. C.:

Composition	Parts per thousand
Sodium chloride	27.21
Magnesium chloride	3.81
Magnesium sulphate	1.66
Calcium sulphate	1.26
Potassium sulphate	0.086
Calcium carbonate	0.12
Magnesium bromide	0.08

Corrosion, 0.00028 in. penetration per month.

Chlorine at 30 deg. C.:
Dry gas: Corrosion, 0.0002 in. penetration per month.
Wet gas: Corrosion, 0.00014 in. penetration per month.

Sulphuric Acid at 30 deg. C.:
3-25 per cent acid under static conditions.
Very inert; corrosion of sample submerged for 8 months in 25 per cent acid = 0.00032 in. penetration.
3-25 per cent acid agitated at 200 r.p.m.
Average corrosion = 0.0006 in. penetration per month.
50 per cent agitated at 200 r.p.m.
Corrosion = 0.00084 in. penetration per month.
70 per cent acid agitated at 200 r.p.m.
Corrosion = 0.00026 in. penetration per month.
85 per cent acid agitated at 200 r.p.m.
Corrosion, 0.00026 in. penetration per month.

Sulphuric Acid at 50, 70, and 90 deg. C. agitated at 200 r.p.m.:

Strength of Acid, Per Cent	In. Penetration Per Month 50° C.	70° C.	90° C.
3	....	0.00354	....
10	....	0.00290	....
20	0.00140	0.00131	0.022
30	....	0.00081	....
50	0.00131	....	0.0076
70	....	0.0040	....
90	0.00202	....	Decomposes acid liberates SO_2

Note: No. 50 metal is not generally recommended for use in sulphuric acid stronger than 70 per cent at a temperature above 70 deg. C.

Alum Solution:
30 deg. Bé. alum solution at the boiling point under conditions of agitation, 0.0006 in. penetration per month.
50 deg. Bé. alum solution at the boiling point under conditions of agitation, inert—i.e., no loss or gain in weight.

Ferrous Sulphate Solutions 30 deg. C., Agitated at 200 r.p.m.:
10 per cent $FeSO_4$ + 1 per cent H_2SO_4, 0.0035 in. penetration per month.
20 per cent $FeSO_4$ + 1 per cent H_2SO_4, 0.0045 in. penetration per month.

Mine Water:
No. 50 metal is extremely resistant to mine waters containing, in addition to free sulphuric acid, sulphates of iron and aluminum. Mine water containing ferrous sulphate, 275 parts per million; ferric sulphate, 1,000 parts per million; aluminum sulphate, 640 parts per million, was made acid with sulphuric acid until solutions containing 3, 6 and 15 per cent free sulphuric acid, in addition to the original sulphates, were obtained. In these solutions, under conditions of agitation, at 200 r.p.m. at room temperature, the corrosion was as follows:
Mine water plus 3 per cent sulphuric acid, 0.00034 in. penetration per month.
Mine water plus 6 per cent sulphuric acid, 0.00028 in. penetration per month.
Mine water plus 15 per cent sulphuric acid, 0.00046 in. penetration per month.

Caustic Soda Solutions:
25 per cent NaOH at 70 deg. C., 0.00085 in. penetration per month.
6 per cent NaOH + 13 per cent NaCl at 70 deg. C., 0.0004 in. penetration per month.
Above solutions agitated at 200 r.p.m.

Sodium Sulphide Solutions:
0.3 per cent Na_2S at 50 deg. C., 0.00015 in. penetration per month.
20 per cent Na_2S at 50 deg. C., 0.0044 in. penetration per month.
Above solutions agitated at 200 r.p.m.

Sulphide of Hydrogen (Dry Gas):
1 per cent H_2S + 99 per cent CO_2 at 600 deg. F., 0.0003 in. penetration per month.

Fresh Pineapple Juice Heated to 70 deg. C.:
Corrosion, 0.000034 in. penetration per month.

Lactic Acid:
Dark lactic (22 per cent), inert at boiling point.
Edible lactic (22 per cent), inert at boiling point.

Note: No. 50 metal is not recommended for use in solutions of ammonia or nitric acid.

This metal is now being distributed by the Supplee-Biddle Hardware Co. of Philadelphia, Pa.

Valves for Paper Mills

The increasing tendency among pulp and paper mills toward the use of liquid chlorine in their bleaching departments has presented some new problems to paper mill engineers. One of these has been to get a valve that will handle both chlorine and bleach liquor successfully.

A solution of this problem has been found by some of the companies supplying chlorine which, it is claimed, meets the requirements well. For example, the Electro Bleaching Gas Co. advises the use of Merco Nordstrom plug valves for handling bleach liquors. A number of large mills have fully equipped their bleaching departments with these plug valves with advantageous results.

The Merrill Co., of 90 West St., New York City, which manufactures this valve, has supplied many of the larger chemical companies with the valve for handling both bleach liquor and chlorine. The Merrill Co. now regards this as standard practice, pointing out that one company has even used its valve for phosgene gas, where any leakage would be a very serious matter.

Catalogs Received

DINGS MAGNETIC SEPARATOR CO., Milwaukee, Wis.—Bulletin 25-P A new bulletin describing magnetic pulleys for removing iron and steel from material conveyed upon a belt.

ALLIS-CHALMERS MFG. CO., Milwaukee, Wis.—Leaflet 2064. A bulletin describing the new Type S centrifugal pump.

COMBUSTION ENGINEERING CORP., New York City.—Catalog QC-1. A catalog on the Quinn fuel oil-burning equipment, including a treatise on the subject of oil burning.

GIFFORD-WOOD CO., Hudson, N. Y.—Bulletin 74. A bulletin describing a new type of electric capstan car puller.

FOXBORO CO., Foxboro, Mass.—Bulletin 113-1. A new bulletin on the Foxboro orifice meter.

CUTLER STEEL CO., Pittsburgh, Pa.—Bulletin 231. A pamphlet describing Duraloy and its resistance to corrosion of acid mine water.

YALE & TOWNE MFG. CO., Stamford, Conn. —A folder describing the new Yale line of roller-bearing trolleys.

Review of Recent Patents

Some Equipment for the Industrial Application of Heat

Heat Exchangers, Stills and Kettles Hold an Important Place Among the Products of Inventive Effort

THE FLOW OF HEAT into or out of various substances is one of the most important of industrial processes. The apparatus used in such operations has an importance and interest that has long challenged the ingenuity of the engineering world. It is a common thing to find many patents issued for such equipment, and the present time is no exception.

In continuous heat processes, especially in the liquid phase, the heat exchanger offers a means of effecting decided economies. A new variation of such equipment is presented by Edward Shaw, of Toronto, Canada (1,456,255, May 22, 1923). The inventor points out that liquids flowing through the passages of a heat exchanger form films on the walls of these passages. These films, though of small depth, appear to operate almost as if they were of a different nature from the bulk of the liquid. They seem to remain as slow moving films along the wall of the passage and the interchange of heat between the two liquids on either side of the passage wall seems to be slowed down by them.

It is claimed that this new design of heat exchanger breaks up these films and makes a more efficient apparatus. This is accomplished by employing exchanger tubes having a multiplicity of reverse bends and causing the fluid to flow through these at a high velocity. This sets up such currents that the films are broken up.

A Multitubular Exchanger

In providing a heat exchanger or cooler in which the fluid to be heated or cooled is caused to flow longitudinally and transversely around the tubes containing the cooling or heating fluid, Homer I. Steffa of Chicago, Ill., has patented the apparatus here described (1,453,292, May 1, 1923).

This exchanger consists of a cast-iron shell with an inlet at one end and an outlet at the other. Communication is obtained between these two points for the cooling or heating liquid by means of a large number of tubes, affixed at each end to a header plate. These plates fit tightly into the shell. The liquid to be heated or cooled is introduced to and removed from the shell by connections placed between these headers. Fitted around the tubes are many vertical baffle plates between which this fluid must flow. These have openings, one to the other, alternately at top and bottom. Within the space between the pairs of these vertical baffle plates are located horizontal baffle plates, so arranged as to cause the fluid to take a zigzag course.

A Still That May Be Cleaned

One of the difficulties met with in many stills used for refining petroleum and similar materials is that of cleaning out the residue after the distillation is completed. John M. Mahoney, of Houston, Tex., offers a solution of this problem in a recent patent (1,455,642, May 15, 1923).

In this new still, of the boiler type, a collecting vat is integrally built in beneath. The bottom of this vat is oval in cross-section and slopes downward each way from the middle toward the ends. At each of the four low

American Patents Issued June 19, 1923

The following numbers have been selected from the latest available issue of the *Official Gazette* of the United States Patent Office because they appear to have pertinent interest for *Chem. & Met.* readers. They will be studied later by *Chem. & Met.'s* staff, and those which, in our judgment, are most worthy will be published in abstract. It is recognized that we cannot always anticipate our readers' interests and accordingly this advance list is published for the benefit of those who may not care to await our judgment and synopsis.

1,458,964—Process of Manufacture of Coke for Metallurgical Uses. A. H. Baille-Barrelle, Paris, France.

1,458,969—Process of Oxidizing Ammonia and Recovering Acid as Akali-Metal Salts. F. Bensa, Genoa, Italy.

1,458,983—Process and Apparatus for Treating Oil Shales. W. K. Kirby, Golden, Colo.

1,458,985—Air-Conditioning Apparatus. L. L. Lewis, Plainfield, N. J., assignor to Carrier Engineering Corporation, Newark, N. J.

1,458,992-3—Production of Camphor and Camphoric Acid. W. T. Scheele, Hackensack, N. J., assignor to H. M. Specht, New York.

1,459,024—Heat-Exchange Apparatus. H. L. Hartburg, Denver, Colo., assignor of one-half to R. J. Binkley.

1,459,036—Deodorizing Material. O. F. Reinhold, Maplewood, N. J.

1,459,058—Apparatus for Removing Blast Gases from Water-Gas Generators. H. Knöfel, Frankfort, Germany.

1,459,072—Regulation of Combustion of Gas and Powdered Fuel. T. A. Peebles, Pittsburgh, Pa., assignor to John M. Hopwood, Dormont, Pa.

1,459,081—Process of Continuous Sulphonation of Benzene, Applicable to Impure Benzenes. P. A. Barbet, Paris, France.

1,459,082—Process for Preparing Salt and the Like. H. W. Bartlett, Alvarado, Calif., assignor to Continental Salt & Chemical Co., San Francisco.

1,459,084—Process of Treating Acid Sludge. O. Bezanson, Woburn, Mass., assignor to Merrimac Chemical Co., Woburn.

1,459,124—Continuous Process of Making Superphosphate. H. A. Webster, Columbia, Tenn.

1,459,127—Method of Determining the Composition of Gases. L. D. Williams and A. Williams, London, England.

1,459,147—Magnetic Separator. A. Dings, Milwaukee, Wis., assignor to Magnetic Manufacturing Co., Milwaukee, Wis.

1,459,156—Distillation and Cracking of Mineral Oils and Other Hydrocarbon-Containing Material. N. V. S. Knibbs, London, England.

1,459,187—Process of Reducing Metallic Oxides. E. B. Pratt, East Cleveland, Ohio.

1,459,212—Rate of Flow Indicator for Venturi Meters. W. Kath, Berlin-Friedenau, Germany, assignor to Siemens & Halske Aktiengesellschaft, Siemensstadt, Berlin.

1,459,254—Drier. W. E. Prindle, Columbus, Ohio.

1,459,326—Apparatus for and Method of Drying or Otherwise Treating Material. E. T. Dow, Bangor, Me.

1,459,328—Gilsonitic Products. C. N. Forrest, Rahway, H. P. Hayden, Raritan Township, Middlesex County, N. J., and O. R. Douthett, Beaver Falls, Pa., assignors to Barber Asphalt Paving Co., Philadelphia, Pa.

1,459,391—Humidity Indicating and Regulating Device. H. P. Clausen, Mamaroneck, N. Y., assignor to Western Electric Co.

1,459,395—Process of Purifying Lactic Acid. Toni Hamburger, Berlin-Dahlem, Germany, assignor to Chemische Fabrik vorm. Goldenberg Geromount & Cie., Wiesbaden, Germany.

1,459,409—Process of Carburizing Hollow Articles. H. W. McQuaid, Canton, Ohio, assignor to Timken Roller Bearing Co., Canton.

1,459,410—Recovery of Byproducts in Mercury Fulminate Manufacture. R. C. Moran, Ridley Park, Pa., assignor to E. I. du Pont de Nemours & Co., Wilmington, Del.

1,459,536—Manufacture of Vat Coloring Matters. E. Kacer, Mannheim, Germany, assignor to Badische Anilin- & Soda-Fabrik, Ludwigshafen-on-Rhine, Germany.

1,459,541—Blood-Albumin Glue. A. C. Lindauer, Madison, Wis., dedicated, by mesne assignments, to the People of the United States.

1,459,581—Flexible Varnish. C. D. Draper, Portland, Ore.

1,459,616—Treatment of Fibrous Cellulose for the Production of Hydrated Derivatives. C. F. Cross and E. J. Bevan, London, England, E. M. Blake, executrix of said E. J. Bevan, deceased, assignors to I. P. M. Syndicate, Ltd., London.

1,459,627—Process and Apparatus for Performing Thermic Processes of Any Kind. A. Hiorth, Asker, near Christiania, Norway.

1,459,659—Electrolyte for Storage Batteries. H. Ellis, P. S. Hart, and W. G. Nunnelly, New Florence, Mo.

1,459,699—Production of Alcohol. J. Van Ruymbeke, Marseille, France. Filed Aug. 15, 1921.

1,459,703—Recovery of Ammonia From Gases Containing the Same. H. Wiederhold and C. Ehrenberg, Furstenwalde, Germany, assignors to Industrial Research, Ltd., London, England.

1,459,704—Gas Vent for Containers. George W. Bennett, Cincinnati, Ohio.

Complete specifications of any United States patent may be obtained by remitting 10c. to the Commissioner of Patents, Washington, D. C.

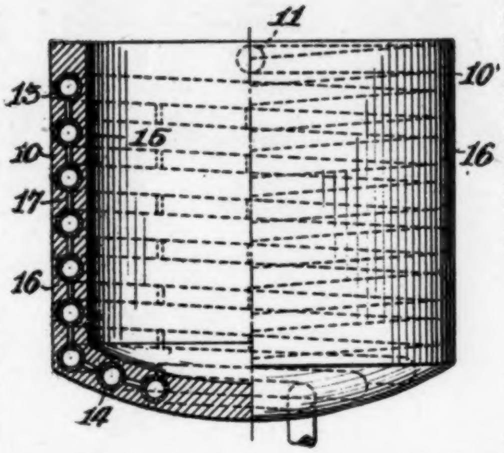
points thus formed a drain pipe is located, its opening controlled by a valve. These drain pipes are connected to header pipes, one for each side of the still. To one end of each header a steam line is connected which can be used for providing the necessary pressure and heat for blowing off the residue.

A Coil-Heated Kettle

There have been numerous attempts to construct cast kettles having coils within their walls through which the heating medium could be circulated, so that as large a percentage as possible of the heat should be transferred to the liquid the kettle without having the contents of the kettle reduced by an inmresed coil.

It is impractical to core the walls of a cast kettle so as to form a coil. Attempts to cast a pipe coil within the walls have sometimes failed because of the expansion and warping of the coil caused by the heat of the molten metal.

A new patent of J. G. Lehman, of



Bethlehem, Pa. (1,454,291, assigned to the Bethlehem Foundry & Machine Co., Bethlehem, Pa., May 8, 1923), claims to have overcome the difficulties hitherto encountered by the means shown in the accompanying cut. It will be noted that the coil is held in position by spacers. These are of steel and are welded to the pipes at close intervals.

Readers' Views and Comments

An Open Forum for Subscribers

The editors invite discussion of articles and editorials or other topics of interest

Filtration Problems Best Solved by Lab. Test

EDITOR'S NOTE: In our issue of May 26, a symposium on Walker, Lewis and McAdam's book "Principles of Chemical Engineering" included a brief criticism by Henry Howard, president of the American Institute of Chemical Engineers. At that time, owing to space limitations, we were not able to include his remarks with regard to the chapter on filtration. Believing that Mr. Howard's ideas on the subject are of distinct value, we are taking this opportunity of presenting them:

"In the chapter on filtration I think too much stress is laid on theoretical calculations for determining the size of filter required. A safer and more reliable method is the use of a small test filter leaf 3 or 4 in. square, with which the material to be filtered can be tested. This is preferably done in a research laboratory and conditions studied to give maximum rate of filtration. Such a study will sometimes cut the time to produce a 1-in. cake from 4 or 5 hours down to 20 minutes."

How Shall We Sell Our Research?

To the Editor of Chem. & Met.:

SIR—In your issue of June 11 you had an editorial entitled "How Shall We Sell Our Research?" in which you advocate the consideration of research not only as an investment but as the vital necessity that causes the growth of industry. In other words, you consider research as sort of "industrial vitamine."

It seems to me that there are few cases in which extensive research can be considered an investment; in most cases it is a speculation. Some of our industrial friends have found it so speculative that they would prefer to have a law passed allowing them the privilege of seizing patents rather than hire research men to solve their problems. One employer complains bitterly because his research staff took 3 months to discover the details of a certain process patented by a foreigner. It probably never occurred to him that a truly competent research staff would have produced a new and better process. Research should be more of an investment and less of a speculation, and the responsibility lies with the man who organizes the research department.

You object to "selling" the directors on the "saving" during the past year due to the research department. The good salesman never dwells long on the past, because it is always the future that is fascinating. The million dollars "in the bush" is far more alluring than $2.25 in the hand. Selling research is not different from selling other things. A clear and vivid account of "possible" profits is perhaps the best argument ever used to sell research.

The whole subject, however, will not be worth considering if the people who desire to have a "working clause" put in our patent law are successful, because no business man is going to invest in research when he can seize the inventions of some one else. Just at present the most vital factor concerning the future of research in this country is whether or not our flag-waving "patriots" are going to be allowed to get away with this proposed legislation.

New York City. D. B. KEYES.

Abolish the 12-Hour Shift

To the Editor of Chem. & Met.:

SIR—Your editorial, "Messrs. Gary et Al. Are Misinformed" in the June 18 issue, is a splendid article. Every word of it is truth, and you have evidently, like myself, been one of those who did the 12-hour shift and the "long turn." Nobody but the unfortunate men who do this know the actual effect. I was a blast-furnace foreman for furnaces Nos. 7 and 8 at South Chicago in 1903 for the Illinois Steel Co., a subsidiary of the U. S. Steel Corporation and I know of no more exhausting, wearing and trying experience than doing the long turn—24 hours of heat, dust, gases and worry. It would sap the physical strength of Hercules.

The furnace shift, as dawn approached after a day and a night at those monster volcanos, was as drawn, tired and hopeless lot of men as I ever saw. Only luck saves the furnaces from disaster. As the long turn drew to a close, we shuffled and stumbled out of the works, tired, dirty, dusty and exhausted, on a hot summer morning, with steel plate structures radiating a hot zephyr in our faces and hot breezes from slag ladles and hot metal cars meeting us as we threaded our way out of the inferno.

In the Middle Ages this turn would receive attention from students of torture chambers; it certainly deserves a place similar to the Spanish Inquisition in the annals of "The History of Metallurgical Workers." If the state governments or the federal government only knew what the 12-hour shift and the long turn did to its citizens, a storm of protest would begin. My observation is that practically only a few men in high places know of these terrible conditions behind the board fences of metallurgical plants.

The 12-hour shift *must be abolished;* the *long turn* will go with it even if dividends must be cut or passed, to save those poor fellows working at blast furnaces. Their condition is really pitiful, and the corporations would be benefited in the long run by having a fresh force of men, rested and willing to work an 8-hour turn.

I do not know much about the outside investigators. Nobody ever investigated in those days.

To investigate the long turn, let the applicant for the job work a year on a modern blast furnace.

Norfolk, Va. RANDOLPH BOLLING.

Important Articles in Current Literature

More than fifty industrial, technical or scientific periodicals and trade papers are reviewed regularly by the staff of *Chem. & Met.* The articles listed below have been selected from these publications because they represent the most conspicuous themes in contemporary literature, and consequently should be of considerable interest to our readers. A brief résumé of each article is included in the reference given. Since it is frequently impossible to prepare a satisfactory abstract of an article, this list will enable our readers to keep abreast of current literature and direct their reading to advantage. The magazines reviewed have all been received within a fortnight of our publication date.

COMPARISONS OF SOME METHODS OF RUNNING WATER-GAS PLANT. James C. King. The general results obtained from a Humphreys & Glasgow installation at the British Fuel Research Station are described. The working figures when supplying a gas of uniform quality are quoted. *Fuel Research Board* (British) Technical Paper 6.

GRAPHIC METHOD FOR COMPUTING HEAT BALANCE. F. A. Shorkey. A convenient way to eliminate the frequent errors resulting from the use of formulas. *Blast Furnace and Steel Plant*, June, 1923, pp. 348-354.

PUMP SUCTION. F. H. Smith. An article on pumps in byproduct plants for handling ammonia liquor, tar, wash oil and other liquids. *Blast Furnace and Steel Plant*, June 923, pp. 322-327.

LA DISTILLATION À BASSE TEMPÉRATURE DES LIGNITES ET DES TOURBES. Marcel Laffarque. A study of the possibilities of oil production from low temperature distillation of low-grade fuels. *La Technique Moderne*, June 1, 1923, pp 321-327.

SOY AND RELATED FERMENTATIONS. M. B. Church. *Department of Agriculture Bulletin* 1152.

PROBLEMS OF SULPHITE PULP MANUFACTURE. Arthur S. Klein. An excellent summary of the present status of the sulphite industry, with accent on the necessary lines of progress. *Pulp and Paper Magazine*, June 21, 1923, pp. 621-622.

THE WORKS OF THE UNION STEEL CORPORATION OF SOUTH AFRICA. G. Robson. The story of the pioneer steel plant in South Africa, together with a description of acid and basic open-hearth practice as carried on there. In addition each unit of the plant is described. *Journal of the South African Institution of Engineers*, May, 1923, pp. 215-272.

MANUFACTURE OF WOOD EXTRACT. J. Arthur Revell. A concise description of the chemical engineering involved in the production of tanning materials from various sorts of bark. *Chemistry and Industry*, June 8, 1923, pp. 245-250.

Men in the Profession

SIDNEY P. ARMSBY, a member of the technical staff of the Dittlinger Lime Co., New Braunfels, Tex., gave an interesting and instructive address before the members of the Dallas (Tex.) Technical Club, June 12, on the importance of lime and its effect on health and industry.

C. G. MAIER, who has been directing the research work of the Fellows in metallurgy at the University of Utah, an activity carried on in co-operation with the Bureau of Mines, has resigned to accept a position as physical chemist at the Berkeley Experiment Station of the Bureau of Mines.

O. C. MARTIN has resigned as works manager for the Nichols Copper Co., Laurel Hill, N. Y., to become manager of the Perth Amboy refinery of the American Smelting & Refining Co. Mr. Martin was with the latter company in various capacities and at different locations for about 15 years, but has been with the Nichols organization since 1914.

Dr. R. B. MOORE, until recently chief chemist of the Bureau of Mines, will continue to act for the present as a member of the Helium Board.

CARL W. NESBITT recently resigned his position with the Atmospheric Nitrogen Corporation of Syracuse, N. Y., to join the research staff of the Victor Chemical Works at Chicago Heights, Ill.

CHARLES W. PUGSLEY, Assistant Secretary of Agriculture, has submitted his resignation, effective Oct. 1, to accept the presidency of the South Dakota State College of Agriculture and Mechanical Arts at Brookings. Mr. Pugsley will have filled the office of Assistant Secretary 2 years at the time his resignation takes effect.

C. WALTER RANDALL has resigned as vice-president and secretary of the Pierce Oil Corporation, New York.

HOWARD RHODE, of the Lehigh Portland Cement Co., Allentown, Pa., gave an interesting address before the members of the local Kiwanis Club, June 21, on the history and operations of his company.

Dr. L. I. SHAW, acting chief chemist of the Bureau of Mines, was a recent visitor at the Kier Fire Brick plant at Salina, Pa.

W. M. WEIGEL, who has been selected to be the non-metals specialist in the Washington office of the Bureau of Mines, will assume his new duties July 15. He is now working as a mineral technologist at the Tuscaloosa Experiment Station.

Obituary

WILLIAM H. ANDREWS, chairman of the board of directors, Pratt & Lambert Co., Buffalo, N. Y., manufacturer of paint and varnishes, died June 19, at his summer residence at Watch Hill, R. I., at the age of 62 years. He was connected with the company for more than 30 years.

F. C. COOK, an insecticide specialist, long in the service of the Bureau of Chemistry, died in Dallas, Tex., June 18, following an operation for appendicitis. Mr. Cook was engaged in co-operative work with the Texas authorities.

WILLIAM SHARPE CORTRIGHT of Bethlehem, Pa., a pioneer zinc manufacturer and for more than 50 years connected with the New Jersey Zinc Co., died, June 21, after a long illness. He was 72 years of age.

Dr. PARKER C. MCILHINEY of New York died June 21 of apoplexy. He suffered his first stroke about a year ago and his convalescence was slow and painful until the attacks became recurrent and finally gave him his release from suffering. He was born in Jersey City in 1870, was graduated at Columbia in 1892, took his master's degree in 1893 and his doctorate in philosophy in 1894. He remained some time as an assistant and finally set himself up as an analytical and consulting chemist in New York City. In analysis his findings were generally admitted to be about the last word, for he was a man of broad scientific scholarship and, in all his work, of meticulous precision. He was remarkably neat and clean in laboratory practice. In association with Louis C. Tiffany he developed the so-called Tiffany incandescent glass and contributed studies and findings of importance to the arts of pottery and enameling, including the applications of enamel to jewelry. He was an earnest student of the chemistry of these substances, and his later work in the technology of oils, fats and varnishes is important. For many years he was honorary secretary of the American branch of the Society of Chemical Industry. He was scrupulous in integrity, keen in appreciation and a sound adviser within his chosen field. Although modest and unassuming in manner, his testimony in court was highly regarded because of his inveterate precision and the clarity of his statements. He was warm in friendship and keenly appreciative of every courtesy, to which he always responded with grace. He was an important member of the fraternity of science in New York and his passing is a serious loss.

Calendar

AMERICAN CHEMICAL SOCIETY, fall meeting, Milwaukee, Wis., Sept. 10 to 14.

AMERICAN ELECTROCHEMICAL SOCIETY, forty-fourth meeting, Dayton, Ohio, Sept. 27 to 29.

AMERICAN ELECTROPLATERS SOCIETY, eleventh annual meeting, Providence, R. I., July 2 to 5.

AMERICAN GAS ASSOCIATION, annual convention, Atlantic City, Oct. 15 to 20.

AMERICAN INSTITUTE OF MINING AND METALLURGICAL ENGINEERS, INC., Ontario and Quebec, Aug. 20 to 31.

AMERICAN MINING CONGRESS, Milwaukee, Wis., Sept. 24 to 27.

ASSOCIATION OF IRON AND STEEL ELECTRICAL ENGINEERS, iron and steel exposition, Buffalo, N. Y., Sept. 24 to 28.

NATIONAL EXPOSITION OF CHEMICAL INDUSTRIES (NINTH), New York, Sept. 17-22.

NATIONAL SAFETY COUNCIL, twelfth annual safety convention, Statler Hotel, Buffalo, Oct. 1 to 5.

Industry and Trade

Current News and Market Developments

Summary of the Week

Numerous appeals for refund of excess customs duties are expected to result from recent decision that collectors may reliquidate downward as well as upward.

Import and export trade in chemicals was larger in May than in April, according to figures of Department of Commerce.

Tariff Commission seeks authority to investigate inequalities in tariff duties on some commodities on which no application for changes have been filed.

Commissioner of Internal Revenue gives formula for denaturing alcohol for use in manufacture of insecticides.

Prices of chemicals during June showed a slight downward trend owing to seasonal declines in consumption and due also to some extent to foreign importations.

Importer brings suit to compel Treasury Department to change tariff classification on importation of vanillin.

Uniform contract for sale of chemicals drawn up by committee of manufacturers and salesmen.

Tariff Commission announces that public hearing on application for reduction in duty on casein will be held Aug. 13.

Chemical Foundation suit moving swiftly. Metz' testimony regarded important. Government's case closed and that of defence opened.

Arsenic is weak and sold on spot at prices lower than had been quoted previously.

Lower prices for the metal have been followed by a reduction of 1c. per lb. in tin oxide.

Chemical Prices Ease Off During June

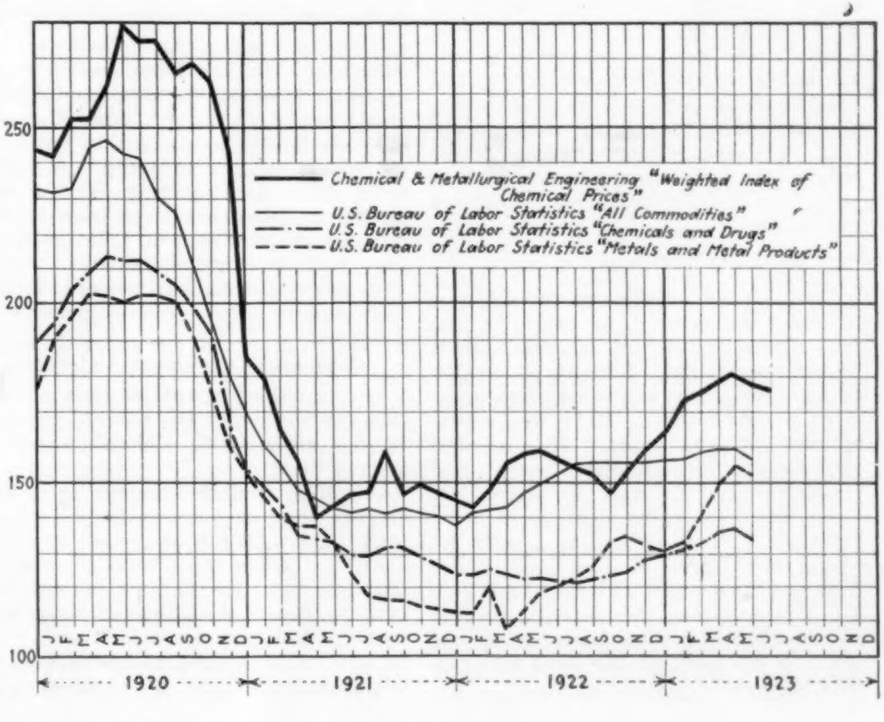
SEASONAL DECLINES in consumption of many chemicals and allied products have been noted during the past month. With the buying end of the trade less active, market values became more difficult to sustain and the general trend of prices has been toward lower levels. With few exceptions, price fluctuations have been within narrow limits.

Chem. & Met.'s weighted index shows that average prices for chemicals were lower than in May, the numbers being 176.45 for June and 178.05 for May. Hence the downward movement of prices, which started in April, still continues, but when reduced to concrete figures, it is found that there is nothing very alarming in the trade either in the producing or consuming ends. It is true that the general level of prices has been lower, but this is a logical sequence of declines in raw materials and of reduced buying operations on the part of consuming industries which are now working on summer schedules.

Bureau of Labor statistics covering the month of May reveal that wholesale prices were materially lower than in the preceding month. The bureau's weighted index number, which includes 404 commodities or price series, fell to 156 in May, as compared with 159 in April, a drop of nearly 2 per cent. The bureau's index number for chemicals and drugs was 134 for May and 136 for April and on metals and metal products the numbers were 152 for May and 154 for April.

The price tendency of chemicals in June, therefore, was about in line with the movement of commodities of other groups as reported by the Bureau of Labor. This may mean that prices in general are seeking lower levels or that temporary slowness in demand is affecting all commodity groups alike.

In the case of certain chemicals, goods of foreign origin have had considerable importance in depressing values. Heavy shipments from abroad have come on our market and prices have been adjusted and readjusted to attract buyers. This competition had a decided bearing on values, for many chemicals of home manufacture and competition from foreign producers promises to be a market factor for some time to come. Export business also has suffered where it has come into competition with foreign goods and the easy position of alkalis as reported by exporters offers an example of the slower trading movement with foreign buyers and the lowering of prices in order to hold the trade of European and South American markets.



Metz' Testimony Is Feature of Week in Chemical Foundation Trial

Heated Arguments Between Kresel and Anderson Take Place—Government's Presentation of Testimony Ended—Defence Opens With Palmer as Witness

THE PAST WEEK has developed several new points in the suit of the government against the Chemical Foundation which is being held in the Federal District Court at Wilmington, Del. The testimony which has featured the week has been that of Herman A. Metz, prominent dealer and manufacturer in the dye and chemical industries. Mr. Metz is a former Congressman from New York State and is himself a member of the Foundation. Colonel Thomas W. Miller, present Alien Property Custodian, also took the witness chair during the week.

Colonel Miller, who was at one time invited to become a member of the Foundation, stated that early in 1921 he had notified the board of directors that he could not give time to the directorship. Immediately following the war he had been appointed to his present post. He stated that he did not know what particular investigation into the status of the Foundation had preceded his signing the bill of complaint which resulted in the present trial. The witness said that after signing of this bill, he talked the matter over with Gaston P. Meads, an agent of the Department of Justice. Mr. Kresel, in cross-examining the witness, read an extract of a letter from the President to Colonel Anderson in which the President said, after describing the transaction of the sale:

"On the face of such an action, it became so apparent to me that an inquiry should be made that I asked for a report by the Department of Justice on the sale of this enemy property to the Chemical Foundation. It appears that the sale was made at so nearly a nominal sum that there is reason to believe that this government has not faithfully observed the trust which was implied in the seizure of this property. The circumstances relating to the entire transaction are of such a character that full investigation becomes a public duty."

Evidence of Herman A. Metz

The government through the evidence of Metz endeavored to establish the true valuation of the patents seized by the Foundation. Because of evasion of the witness in answering the questions of Mr. Kresel, Metz was reprimanded by the court. He asserted that the patents covering salvarsan and neo-salvarsan, as well as novocaine, were worth a great deal more than $250,000. When pressed by Kresel, he stated that under an exclusive license they would be worth at least $1,000,000. He admitted that the patents granted to the Chemical Foundation cover not over 10 per cent of the dyes made in this country.

Kresel openly charged Metz with being the "invisible plaintiff" in the present action. He endeavored to prove that Metz has co-operated with German interests to obtain the return of these patents and that he has promised to do all in his power to obtain such return. Said Mr. Kresel:

"The invisible plaintiff which we have claimed influenced government officials to bring this suit is no longer invisible. He is here, we shall show to the court, and we shall prove that this witness was not only the representative of the German dye and chemical interests but that he and the interests he is the agent for brought about this suit."

Cross-examination developed the allegation of the defence that the Germans, while owning thousands of patents in this country, did not operate any of them in American factories, but prevented the manufacture here of essential dyes and chemicals and threatened "heavy suffering" after the war on such houses as sought to build up an American dye industry. A letter from Metz to President Wilson was quoted to show that Metz tried to discourage the government from sponsoring an American dye industry, urging instead measures that would induce Germany to renew her shipments to America.

Have the courts of the United States a right to review Presidential discretion? Was the formation of the Chemical Foundation based on a conspiracy? What is the true motive behind the present trial? Is there actually an "invisible plaintiff" behind the government? Was the price paid for the patents inadequate? All of these questions go to make this trial unique and important.

Contention of Colonel Anderson

In the bill of complaint it is alleged that the seizure of the patents resulted from a conspiracy. Colonel Anderson argued that:

"Nothing is more common in a conspiracy than to get somebody to do a lawful act. That is what the complaint charges. When the Custodian was induced to seize the patents his act was lawful, though the object of those who induced him may have been unlawful. If, after the seizure, he co-operated in organization of the Foundation with knowledge of its purposes, he would be engaging in an unlawful act and, because he would then have adopted the conspiracy and been liable for every act in it, it would be void from the beginning."

Testimony of A. Mitchell Palmer

Something of a sensation was caused in the court when former Alien Property Custodian A. Mitchell Palmer, first witness for the defence, gave his testimony. In a dramatic recital of war conditions that made necessary the seizure of German-owned chemical and dye patents, he denied categorically that he, President Wilson and Acting Secretary of State Frank L. Polk were duped into the deal of transfer of the seized patents to the Chemical Foundation. He testified that the President, far from being hoodwinked by the manufacturers into making the sale to the Foundation, was thoroughly cognizant of the situation. Judge Morris ruled that since the ex-President himself could not be called to the witness chair, all of the conversation between himself and Palmer would be accepted as evidence.

Mr. Palmer pointed out the fact that the seizure and sale of enemy-owned property was a measure adopted in the darkest hour of the war. When the situation appeared blackest he talked over the situation with President Wilson, with the result that legislation was enacted on Nov. 4, 1918, which authorized the seizure and sale of the patents. The President issued on Dec. 13 of the same year an executive order vesting in Frank L. Polk "all power and authority conferred upon the President by the provision of section 12 of the trading with the enemy act, as amended, other than designation of depositaries, which was vested in the Alien Property Custodian."

In continuing his testimony A. Mitchell Palmer said in part:

"I saw that if I adhered to that policy of taking over and selling only such patents as were affiliated with concerns which I was proposing to sell I would miss the accomplishment of the purpose we had in mind of Americanizing the industry. Therefore I announced on Jan. 13 that we would take over and sell enemy-owned patents where they were important to an industry in America."

Reaction of Judge Morris

As the case stands at the time of going to press, Judge Morris, who is hearing the case, announces that he is not quite clear on several points. In part he says:

"There is still doubt in my mind as to the power of the judicial department to review any act within the Presidential discretion. Notwithstanding my opinion that a President or ex-President may not be summoned into a court to defend his acts, I believe that when charged with an improper act there is no avenue and there is no character of evidence that has evidential value that may not be used under such

circumstances to show that he did not so act.

"I will state an impression that I am gathering. I have not read Mr. Palmer's report at all. I have not had it in my hands. I know its contents only by what has been read to me and stated to me at the bar. But I am wondering if it makes a full disclosure of the state and condition of the alien property, particularly of the facts with relation to the chemical industry, and I have understood from such reading that it does, how there is actual fraud involved—I must use the legal term, because I have got to use it sooner or later, and I might as well use it now—and if there is actual fraud involved, whether the grossest fraud, if fraud existed, is not upon the government officials who acted with knowledge, rather than upon the representatives of the several companies that were engaged in the manufacture or sale of dyes and chemicals; for, in the one case—that is, the government officials—it seems to me that probably they acted with full knowledge and in so acting they acted in breach of trust, while the representatives of the dye and chemical industry only attempted to have them so act.

"I am afraid I have stated that rather crudely and in such a way as to indicate that I have an opinion with respect thereto, while, as a matter of fact, I have only tried to indicate that my impression now is that if the government succeeds in establishing fraud in this case and a full disclosure of the facts before the government officials acted, the inevitable conclusion of the government's contention would be that the grossest fraud would be on the government officials rather than on the persons engaged in the industry."

At the present time Judge Morris has practically reserved judgment on the evidence recorded. The entire question hinges on the right of the court to review Executive discretion. It has already been drawn to the attention of the court that President was conversant with the situation when the sale was made. Frank L. Polk, who put through the deal for the government, demonstrated familiarity with the facts when he testified. Metz' testimony stands on record, though the Judge has not signified whether or not he agrees that Kresel's charge of invisible plaintiff is borne out. Colonel Anderson for the government stoutly denies that such was the case. While not making the case one of monopoly under the Sherman act, he demonstrated to the court in closing his belief that certain elements of monopoly enter into the Foundation. The motive or will to obtain monopoly of the dyestuffs and other materials covered by these patents underlaid the original act of formation, according to him. He maintains that Congress need not return these patents to the Germans providing fair remuneration is made to them for their use and that under unfulfilled conditions of our treaty with Germany we are released from our obligation to return these unless we so desire.

Export Shipments of Chemicals in May Valued at Nearly $12,000,000

Totals Show Gain Over Figures for April—Imports Also Record Increases for the Month—Imports of Paints and Pigments Decline

IMPORTS of chemicals and allied products during May show aggregate increases over April imports and are running decidedly ahead of those of May, 1922. The increases applied to the dutiable as well as to the chemicals on the free list. Free list imports during May were valued at $8,725,404. Dutiable imports aggregated $3,843,429. These compare with $8,598,464 and $3,677,735, respectively, for April.

The long-predicted slump in the imports of coal-tar chemicals has not made itself manifest. The May figures, which just have become available, show that the value of these imports totaled $1,646,168. This is nearly $500,000 greater than imports in April and nearly $700,000 greater than imports in May, 1922. There was a slight falling off in imports of colors, dyes and stains. The value of those commodities brought in in May aggregated $388,039, as compared with $414,946 in April.

A decline also was shown in imports of paints, pigments, and varnishes. May imports were valued at $325,568, whereas $348,807 worth of these commodities were imported in April.

Fertilizer Imports Slump

One of the outstanding facts revealed by the May figures is the decided slump in the value of fertilizer materials brought in. In April these imports exceeded $7,000,000 in value, whereas the May receipts fell just under the $6,000,000 mark. The decline was in materials other than nitrate of soda, since it was imported in larger quantities in May than in April. The May receipts of sodium nitrate passed the $5,000,000 mark.

Exports of chemicals and allied products in May were valued at $11,821,081. This shows a healthy increase over April, when the value of all such products exported was $11,497,777. The improvement over May of 1922 is much more marked. The value of exports in that month were $10,425,811.

The exports from the United States of coal-tar products more than doubled between May, 1922 and May, 1923. In the latter month coal-tar products to the value of $1,270,611 were exported. This compares with $1,098,615 in April. Pigments, paints and varnishes contributed something to the improvement May shows over April. The value of those exports in May was $1,462,636, showing nearly $100,000 better than April and more than $400,000 better than May of 1922.

One of the surprises of May figures is the decided upturn of exports of fertilizers and fertilizer materials. The value of these exports in May aggregated $2,817,570, nearly $800,000 better than May, 1922, and nearly $600,000 greater than those of April. Sulphate of ammonia to the extent of 24,169 tons was exported during May. Cuba took 5.034 tons, China 1,152 tons and Japan 16,430 tons.

Exports of Explosives Increase

There was an increase in the tonnage of explosives exported, but price levels caused a falling off in value. The May exports of explosives totaled 1,353,022 lb., whereas the April movement abroad was 1,744,405 lb. The slump in this type of exports can be appreciated better by reference to May, 1922, when 2,360,105 lb. of explosives was shipped out of the country.

The foregoing figures are those of the Department of Commerce. This is the first month since the passage of the new tariff bill that export and import figures have become available at the same time. Prior to the enactment of this tariff bill, 20 days after the close of the month was the average time necessary for the statisticians to compile the returns from the sixty-three customs districts. The fact that May imports and exports were made available on June 25 indicates that the difficulties incident to the enactment of new schedules practically have been overcome.

To Increase Butanol Output

The Commercial Solvents Co. has bought the plant of the United States Food Products Co., at Peoria, Ill. The plant will be remodeled and will be used for manufacture. Demand for butanol has been greater than the producing capacity of plants and last April the directors of the Commercial Solvents Co. voted to issue preferred stock in the amount of $1,000,000 to finance the construction of a new plant in order to increase production of butanol. This plan was changed when a suitable plant was found as the company will thereby be able to increase production at an early date.

Formula for Denaturing Alcohol

D. H. Blair, Commissioner of Internal Revenue, has sent a notice to collectors and others concerned, in which is set forth a formula for denaturing alcohol and called "Formula 4-A." The formula is authorized for use in the manufacture of fungicides, insecticides, deodorants and substances of a similar nature. The formula provides that for every 100 gal. of ethyl alcohol add 0.5 gal. benzol and 1 gal. of the following solution: 5 gal. of an aqueous solution containing 40 per cent nicotine, 0.4 lb. acid, yellow dye (fast Yellow Y), 0.4 lb. tetrazo brilliant blue, 12 B. Conct., water to make 100 gal.

Committee on Uniform Sales Contract for Chemicals Submits Report

New Document Modeled After Standardized Form of Coal and Iron Contracts—Can Be Used for Sale of Any Chemical or Dye

THE JOINT COMMITTEE representing the Chemical Manufacturers' Association and the Salesmen's Association has completed its work of drafting a uniform sales contract for the chemical industry. In the committee report it is stated that it was unanimously agreed that a contract applicable to the sale of all chemicals could be drawn in conformity with the style and terms of the uniform contracts for coal and iron approved by the purchasing agents, and that such a contract would do much to improve contract conditions. It was the sense of the meeting also that more definite assurances on delivery could be given to buyers and that any clause protecting prices against decline is unfair and nullifies the legal standing of a sales instrument.

The joint committee organized and divided its work between two committees appointed by the Chemical Manufacturers' Association and the Salesmen's Association.

Modeled after the standardized form of the coal and iron contracts, approved by the National Association of Purchasing Agents and indorsed by the Department of Commerce, a contract was drafted by the Salesmen's committee upon the terms and conditions now used by chemical sellers. This draft was submitted to the Manufacturers' committee and by them studied and revised. This revised contract was three times further revised by this joint committee. It has been scrutinized by the various companies and submitted by them to their attorneys for criticism and suggestion. The result of 3 months of this work is now placed before the industry.

Contract Carefully Drawn

In commenting on the form and style of the contract the committee report says: "The uniform sales contract which we present to you has been drawn carefully with the interests of both buyers and sellers in mind. Its form and style is that adopted in other great industries, thus making for the convenience of the purchasers. It contains no trick conditions and every effort has been made to remove any ambiguity that might result in misunderstanding. It is a legal document, more strict in many clauses than the majority of existing chemical contracts, but also more just. It can be used for the sale of any chemical—heavy, fine or dye; imported or domestic—in any container by either maker, agent or broker. Its general terms and conditions cover all necessary legitimate points and need not be modified at all to meet special conditions. There is, in fact, but one case which it does not meet completely—i.e., the sale of chemicals for further resale; and this may be covered either by erasing the phrase 'for.... use and consumption in factor ... located at ...' or by printing a special resale form with this phrase omitted from the preamble."

The body of the model contract as adopted by the joint committee reads as follows:

The Seller hereby agrees to sell and furnish and the Buyer agrees to purchase and accept the quantity and kind of the following materials required by the Buyer for—own use and consumption in factor—— located at ——————during the period from——————19— to——————19— inclusive; at the price hereinafter stated and upon the terms and conditions herein contained, to wit:

[Space is then left for filling in details under general headings of: Article; Quality; Quantity; Delivery; Price; Container Charges. Continuing, the terms and conditions of the contract are set forth as follows:]

Terms and Conditions

1. *Terms of Payment*—Invoices shall be paid in net cash, within thirty days of date of same, payment to be in U. S. gold coin or its equivalent. Non-compliance with said terms of payment shall give the Seller the right to suspend further shipments until all previous shipments are paid for; and if in the judgment of the Seller, the financial responsibility of the Buyer shall at any time become impaired, and written notice thereof be given by the Seller to the Buyer, the Seller shall have the right to suspend further shipments on this contract until adequate security for payment is furnished by the Buyer. If such security is not furnished within thirty days after the notice, the Seller shall have the right to cancel this agreement.

2. *Weights*—Invoice weights and tares to govern.

3. *Deliveries*—Each month's quota shall be considered as a separate and independent contract.

The Buyer shall give to the Seller orders covering shipment on or before the 15th day of the month previous to the month of shipment.

4. *Contingencies*—In the event of war, fire, flood, strike, lockout, accident or other like cause beyond the control of the parties, interfering with the production, consumption and transportation of the materials herein described, or the supply of any raw material of which the said materials are a product, deliveries under this contract may be suspended during the period required to remove the cause or repair the damage, and the total quantity deliverable under the contract shall be reduced in proportion to the duration of such suspension.

5. *Taxes*—Any tax or other governmental charge upon the production and/or sales and/or shipment of the materials herein specified becoming effective within the term of this agreement may, at the Seller's option, be added to the price herein provided.

6. *Containers—(a)* The Buyer agrees to use Seller's returnable containers only for the reasonable storage of Seller's material originally shipped therein, and to return same, freight prepaid, within———days. In event containers are not returned in——— days the Seller shall have the option of refusing to accept the same. All such containers will be charged at the Seller's regular prices and paid for at the same time as the contents, but credited at the price charged when returned as above provided.

(b) If the material covered by this contract is shipped in tank cars furnished by the Seller, the Buyer agrees that such tank cars will be unloaded within forty-eight (48) hours (Sundays and holidays excepted) after receipt thereof.

7. *Claims*—The Buyer agrees to make an examination and test on arrival and that failure to give notice of claim within ten (10) days of arrival shall constitute a waiver by the Buyer of all claims.

8. *Agreements*—No agreements or understandings not expressly stated herein shall be binding in the interpretation of fulfillment of this agreement.

This contract shall be binding upon, and inure to the benefit of, the successors of the parties hereto respectively.

Trade Notes

Charles M. Mason and Henry M. Miner, who were appointed temporary receivers for Woods Oil, a corporation having a warehouse at Newark, N. J., and a plant at New Orleans, La., have now been named as permanent receivers.

Import duty on alcohol entering Egyptian ports, which has been denatured in accordance with requirements of the customs authorities of Egypt, has been reduced to 2 milliemes per kilo.

The Empire Piece Dyeing Co., of Paterson, N. J., will erect a new dye house to cost $13,000.

H. Gardner McKerrow has been appointed sales manager for the Althouse Chemical Co., of Reading, Pa.

The plant of the Republic Varnish Co., at Newark, N. J., was slightly damaged by fire last week.

Mr. and Mrs. Spencer D. Embree returned to New York last week from their wedding trip to Cape Cod. Mr. Embree is connected with the sales department of Semet-Solvay.

During April Spanish production of quicksilver was 4,380 flasks and sales amounted to 7,900 flasks. Stocks on hand at the end of the month were 16,624 flasks.

Chemical Salesmen Hold Outing

The Salesmen's Association of the American Chemical Industry held its outing on Saturday, June 23. After an enjoyable sail from New York to Atlantic Highlands, the party proceeded by rail to Long Branch and thence by special trolleys to Price's Hotel at Pleasure Bay. An interesting program of games had been arranged by A. J. Binder, chairman of the outing committee. Special interest centered in the quoit contests, which were divided into four sections. The winning teams consisted of Bedell and Dinkens, Lind and Prior, Chew and Dunning and Kilcomman and McNair. A special elimination contest brought together the best players present and resulted in a victory for Thomas J. Grady of Philadelphia. Pipe races were won by Messrs. Nagel, Lind and Dunning, respectively.

After the dinner a short business session was held at which it was decided to select a committee to nominate officers for the annual meeting of the association to be held in September. The following were elected members of this committee: John Chew, Warner Chemical Co., chairman; F. H. Summers, Noil Chemical & Color Co.; George Bode, Roessler & Hasslacher Chemical Co.; A. J. Binder, Sherwin-Williams Co.; W. I. Doan, Dow Chemical Co.; H. B. Prior, H. B. Prior Co.; J. H. Hazard, Hazard Advertising Agency.

Washington News

Customs Ruling Opens Way for Excess Duties Refund

Hundreds of appeals for refund of excess customs duties are expected by the Treasury Department as a result of a decision by the United States Court of Customs Appeals in which it was held that collectors may voluntarily reliquidate downward as well as upward within a year from the date of payment of duty, even though no protest was filed by the importer within the prescribed 30 days.

Under the statute of June 22, 1874, still in effect, collectors are authorized to reliquidate within a year from the payment of duty. This has been interpreted and administered as meaning reliquidation upward, to increase the duty only. In the decision by the Court of Customs Appeals May 31, it is declared that reliquidation may be either upward or downward under this law. Hence an importer who has paid a high rate without protest within 30 days, may, if the collector will reliquidate the entry within a year, secure a refund in such cases as those where in the meanwhile some other importer has appealed and has won a lower classification for a similar importation.

The case at issue was that of the Godchaux Sugars, Inc., of New Orleans. In 1920 this company entered a retort for activating carbon as entitled to free entry as machinery for the manufacture of sugar. The collector subsequently assessed duty against the retort. The company failed to protest within 30 days, due to the oversight of an attorney. Later in the year the Treasury Department declared a similar retort entitled to free entry and the New Orleans collector reliquidated the Godchaux entry with this as a precedent, and declared it free. The Secretary of the Treasury directed a third liquidation, with assessment of duty, claiming that the company has lost its rights by not protesting within 30 days. The company then paid, and protested. The protest was upheld by the Board of General Appraisers, and then by the Court of Customs Appeals, in a sweeping decision giving collectors the right to reliquidate downward as well as upward within a year.

Germans Advised Not to Start More Margarine Factories

A report from Harburg states that the *Margarinezeitung* has issued a warning to the German public, to the effect that Germans should not engage in more margerine enterprises, since the number of factories now in existence is sufficient to supply all Germany and the border states. Within the past half year about fifty new margarine factories have been organized in Germany, principally in the northern part of the country.

Importer Applies to Court to Change Tariff Classification

The Treasury Department has filed an answer in the nature of a demurrer to the suit against Secretary Mellon filed in the District of Columbia Supreme Court by Morana, Inc., a New York Corporation importing and manufacturing perfumes, cosmetics and soaps, by which a mandamus was sought to compel the Secretary to accept payment of duty on an importation of vanillin at 45 per cent ad valorem under paragraph 61 of the 1922 tariff act. The New York appraiser assessed the importation under paragraph 28 at 7c. per pound and 60 per cent ad valorem, American selling price.

In its demurrer, the Treasury Department asserts that the District of Columbia Supreme Court has no jurisdiction in the case, as the tariff act provides a remedy for the importer, by appeal to the Board of General Appraisers and thence to the Court of Customs Appeals, if he feels he has been treated unjustly.

This is the first time that an effort has been made outside the customs courts to compel a change in tariff classification.

In its petition for a writ of mandamus, Morana, Inc., sets forth that in April it purchased two cases of vanillin in Paris and when it arrived at New York declared it for entry at 45 per cent under paragraph 61, which specifically mentions vanillin as dutiable at that rate if not marketable as perfumery or a cosmetic and if it contains less than 10 per cent alcohol. It is claimed that this importation is not marketable as perfumery or cosmetic and that it contains no alcohol, but is a raw material.

The New York appraiser assessed the importation under the last proviso of paragraph 28, the finished coal-tar products paragraph of the act, which provides "that any article of product which is within the terms of paragraph 1, 5, 38, 40, 61, 68, 84 or 1585, as well as within the terms of paragraph 27, 28 or 1549, shall be assessed for duty or exempted from duty as the case may be under paragraph 27, 28 or 1549."

Bureau of Mines Studies Rare Metals Production

The Bureau of Mines is engaged in a study of the methods of preparing rubidium, caesium, strontium and other rare metals not now available on the American market. The bureau desires to prepare sufficient quantities of these metals for use in research laboratories in the hope that uses for them may be developed. As soon as any private concern or individual is in a position to furnish supplies of any one of these rare metals, the bureau would discontinue production.

Tariff Commission Not to Initiate Investigations

Pending President's Return, Will Confine Inquiries to Commodities on Which Applications Are Made

How far the Tariff Commission will be permitted to go in initiating inquiries under the flexible tariff looking to possible changes in duties in cases where no applications for changes have been filed with it will not be determined until President Harding returns from his trip to the West.

The commission on June 16 submitted to the President recommendations that it be authorized to investigate several commodities in which it was considered inequalities in tariff duties exist, although no applications for relief have been filed. The identity of these commodities was not disclosed.

The President left for the West June 20. Prior to his departure he authorized the commission to extend its investigation into costs of production of infants' cotton hosiery, ordered March 27 as the result of an application for an increased duty filed by domestic manufacturers, to include cotton hosiery of all classes, whether for men, women or children. The Executive took no action regarding the other suggestions of the commission, however, before starting on his trip.

Little importance is attached to the extension of the hosiery inquiry, as the tariff act makes no distinction between hosiery for infants and other hosiery and it would be difficult for the commission to separate costs of the one class from the others in many of the mills, it was said.

The important precedent for the policy of administering the flexible tariff will come when the President decides whether the commission shall investigate commodities regarding which no related application has been filed. As the result of a conference between the Executive and members of the commission some weeks ago it was announced that no investigations looking toward possible changes in duties should be undertaken by the commission, excepting in cases where applications had been filed, until after consultation with the President.

Casein Hearing on Aug. 13

A public hearing on the application for a reduction in duty on casein has been set by the Tariff Commission for Aug. 13. This is the first of the chemical investigations being conducted by the commission under the flexible tariff to be fixed for hearing. It is probable that the second chemical hearing will be on sodium nitrite.

The application in the case of casein was filed by a committee representing coated paper manufacturers, who asked a decrease of 50 per cent in the duty of 2½c. per pound named in the 1922 tariff act. Casein was on the free list in the tariff act of 1913 and also in the tariff of 1909.

Ruhr Chemicals and Dyes at 50 Per Cent Production

Joint cable from American Commercial Attachés Chester Lloyd Jones at Paris and C. E. Herring at Berlin, who have been making a trip through the Rhineland and Ruhr districts:

"The present situation in the Ruhr and elsewhere in occupied Germany is characterized by a virtual transportation paralysis.

"While it is impossible to estimate chemical and dye production, it is apparently less than 50 per cent of normal quantity, especially since the recent occupation of certain plants and seizure of available stocks.

"Production in the British zone is still normal, but practically no coal or derivatives are obtainable from outside the British area. Chemical plants in the Franco-Belgian zone are practically idle.

"Accumulated stocks in general are smaller than previously were assumed, because the inability to sell has been offset by a greatly declining production. The end of the deadlock, therefore, is unlikely to affect the international market seriously.

"Stocks of chemicals and particularly dyestuffs are very low in the French and Belgian zones, while in the British zone, in unoccupied Germany and abroad supplies have not been greatly increased. There is a probability of a shortage of chemicals and dyes if the present deadlock is continued, rather than of a quantity of supplies for dumping, but the seizures of 862 tons of anilins and 1,597 tons of alizarine, vat dyes and indigoes at Ludwigshafen and additional quantities elsewhere create the possibility of disturbed market in the near future."

An abstract from the weekly report for the week ended May 27, 1923, submitted by Charles E. Herring, commercial attaché, Berlin, says that the occupied plants have been abandoned by the French, as the dye quotas are obtained.

Oil Trades Association Holds Outing at Massapequa

The Oil Trades Association of New York held its annual outing at Massapequa, L. I., on June 21, and more than 150 members and guests participatea. Automobile buses transported the "party" to the South Shore resort. After luncheon the petroleum division engaged the vegetable oil men in a baseball game, but the contest was brought to a close in the third inning because of the terrific heat. Dennis Bergen, president of the association, made a home run and this enabled the petroleum men to win by a score of 2 to 0. Later many of the members rode over to the beach at Amityville for a dip. At a short business session Theodore P. Cooper, president of the Oil Trades Association, of Philadelphia, was elected an honorary member. Albert J. Squier was chairman of the entertainment committee.

Paint Club Outing at Portaupeck Well Attended

More than 125 members and guests attended the annual outing and games of the Paint, Oil and Varnish Club of New York, on Tuesday, June 26, at Green Gables, Portaupeck, N. J. The steamer Atlantic, owned by the National Lead Co., transported the "athletes" to Atlantic Highlands, whence buses specially hired for the occasion conveyed the party to the Shrewsbury River resort. On the trip down the bay a brief business meeting was held at which E. C. Peters, chairman of the executive committee, presented a resolution, duly adopted, in which the club extended its sympathy to the bereaved family of the late W. H. Andrews, chairman of the board of directors of Pratt & Lambert, Inc., and an ex-president of the club. A vote of thanks was tendered the National Lead Co. for the use of the steamer Atlantic.

H. M. Howard, chairman of the membership committee, presented the names of eight new members: Hoskison Gates, of the Evans Lead Co.; W. C. Crawford, Southern Can Co.; Louis M. Rosenberg, American Elaterite Products Co.; Irving Barcan, of Irving Barcan, Inc.; R. H. de Greef, of R. W. Greef, Inc.; G. E. Bennett, Pittsburg Can Co.; Irving R. Boody, of Irving R. Boody & Co., and H. H. Stiller, of the Wishnick-Tumpeer Chemical Co.

H. D. Ruhm, president, presided. W. R. Morpeth was chairman of the entertainment committee.

Chemical Engineers Form Plans

At the meeting of the American Institute of Chemical Engineers held at Wilmington, Del., June 20 to 23, plans were made for the next two meetings of the Institute. From Dec. 5 to 8 a meeting will be held at Washington, D. C., when the work of the government bureaus of research and technology as related to industry will be reviewed and discussed. It is regarded as especially desirable that a meeting with such a theme should be held at the headquarters of the bureaus.

Next summer's session is to be held from July 15 to 18, at Denver, Colo. The principal subject for discussion is to be that of chemical engineering in the sugar industries, with especial reference to the beet sugar industry. The significance and development of Western industry is also to be considered at this meeting.

Manganese Exports From Brazil

Exports of manganese from Brazil for the period from Jan. 1 to April 18 amounted to 98,018 metric tons. The figures for shipments during January were 62 tons to Argentina, 7,100 tons to the United States, and 3,150 tons to France; and during February, 40 tons to Argentina, 24,400 tons to the United States, and 7,150 tons to Great Britain.

News Notes

Sulphite spirit as a motor fuel has been thoroughly investigated in the army and navy of Sweden, according to a Reuter dispatch from that country. The results have been such that all motor vehicles bought for national defence in the future are to be constructed for the use of sulphite spirit as well as for benzine.

The Polish glass industry is active. The lower cost of production in that country allows the competition of Germany and Czecho-Slovakia to be met. At present eighty-one plants are producing various wares, the total annual production at the present rate amounting to somewhat more than 100,000 tons.

One standard size for common brick and one for face brick were adopted formally at a conference of manufacturers, distributors and representatives of large consumers held at the Division of Simplified Practice, Department of Commerce, on June 21. In this way at least 38 rough brick and 35 smooth brick varieties were eliminated.

Paper production and consumption information which has been furnished since 1917 by the Federal Trade Commission in the form of monthly statistics is no longer to be supplied. This step was made necessary by the large increase in the expenses of the commission for legal work.

Japanese financial interests have engineers in Queen Charlotte Islands, British Columbia, looking over the great stands of pulpwood there with a view to establishing a pulp mill. Vancouver capitalists are interested with the Japanese. Japan takes a vast quantity of wood pulp from British Columbia mills.

A large deposit of high-grade pitchblende which has recently been discovered by the Katanga Copper Co. in the Belgian Congo has put a stop to the production of carnotite ores in the United States. The Congo ore is thirty times as rich as American carnotite and is being laid down in the United States at one-half the price which prevailed here a few months ago.

Centrifugal concentrator problems constitute one of the major pieces of work dealt with at the Reno Experiment Station of the Bureau of Mines. A larger machine of new design now is being considered to carry the experiments to a quantitative scale.

The British silk-manufacturing firm Courtaulds has decided to establish a large plant in the province of Quebec near Quebec city, for the manufacture of artificial silk yarn.

Construction has commenced at Beachville, Ont., on a cement plant for the Toronto Cement Corporation, which will have a production of 4,500 bbl. of cement per day, or about one and a quarter million barrels per year.

Facts and Figures That Influence Trade in Chemical Products

Market Conditions

Current Prices
Imports and Exports
The Trend of Business

Seasonal Conditions Prevail in Market for Chemicals

Consuming Trades on Summer Schedules Are Buying Mainly for Current Needs—Prices Easy With Buyers in Position of Advantage

AVERAGE prices for chemicals again showed a decline for the week. Different consuming trades are running at reduced capacity and naturally are not consuming chemicals to the same extent as in the more active seasons of the year. Outside a few chemicals which are well sold ahead, buyers are taking the initiative to stir up business and buyers are getting the benefit of price concessions.

Demand for fungicides and insecticides has been fairly good but has been spread over a greater variety of materials and this has been disappointing to manufacturers of certain lines who have not sold in the volume expected. Paris green is easy on the present market and calcium arsenate, for which a heavy shortage had been predicted, is in plentiful supply and from the way it is moving, little is to be expected in the way of price advances. Arsenic is lower on spot than in preceding weeks and judging from the price trend, production is ample for consuming requirements. Producers of copper sulphate report a good season for that chemical but heavy offerings of imported grades have been and still are a weakening factor on prices and further declines were made in the past week.

Fusel oil has been in limited supply for some time. This condition resulted from reduced production at home and curtailment of imports. Reduced production was necessary because other materials were competing on more favorable price differentials and as long as the substitute materials were available there was no call for fusel oil. During the week it was announced that production of butanol would soon be increased and this is not regarded as favorable for increasing the output of fusel oil.

The metal markets have shown an easy tendency and this has been reflected in the market for metal salts some of which were lowered in price and others are expected to sell off unless there is a change in the position of the metals.

Fertilizer chemicals have been in the slump which usually follows the close of the fertilizer season. Stocks of nitrate of soda have been worked off by offering attractive prices but distant positions have held up well. Sulphate of ammonia has met with some interest with buyers willing to place contracts but resale offerings have given an unsteady appearance to spot values.

Arsenic Lower on Spot—Calcium Arsenate Irregular—Tin Oxide Reduced—Paris Green Offered at Concessions—Imported Copper Sulphate Easier for Spot and Shipment — Formaldehyde Sells Off—Tartaric Acid Weak — Prussiate of Soda Reaches New Low

Acids

Acetic Acid—Unsold stocks are still moderate in value and while demand is not pressing, there is a fairly steady call for deliveries and new business has been good for this time of year. Prices are unchanged at \$3.38@\$3.63 for 28 per cent; \$5.48@\$5.75 for 30 per cent, and \$12@\$12.75 for glacial.

Citric Acid—Improved buying was again reported and good call for contract deliveries of domestic was noted. Stocks of domestic are comparatively light and prices are somewhat nominal for nearby deliveries owing to the sold up condition of certain producers. No change has been made in quotations, which are given at 49@50c. per lb. Imported grades have sold at 51c. per lb. and appear firmer, as little is heard of any shading of prices.

Nitric Acid—Outside of a readiness on the part of some sellers to shade quotations there is nothing of interest in the present market. Demand is slow and routine quotations are \$4.50@\$5 per 100 lb. for 36 deg.; \$4.75@\$5.25 for 38 deg.; and \$5.25@\$5.50 for 42 deg.

Oxalic Acid—Imported grades have been very dull and this combined with an easy tone to the market for domestic has made prices irregular with buyers able to obtain concessions. Spot goods were quoted at 13c. per lb. but this was by no means firm and there were reports that holders would accept 12½c. per lb. Domestic acid has been easy in tone partly because of poor demand and partly because some sellers were eager to secure whatever business was passing. Prices for domestic are quoted at 12¼c. per lb. at works.

Sulphuric Acid—An unusually good movement is reported for this time of year. Several consuming trades, however, have cut down operations and are less insistent for contract deliveries and those who are not covered ahead are not in the market for fresh stocks. Hence buying is quieter than previously noted and no difficulty is now experienced in securing prompt deliveries on new orders. Prices are steady at \$11@\$12 per ton for 60 deg. acid and \$15@\$16 per ton for 66 deg. acid in tanks.

Tartaric Acid—Buying shows improvement but is spasmodic and an easy tone was noted as far as prices were concerned. Imported grades while generally quoted higher were available at 35½@35¾c. per lb. and the lowering in values for foreign offerings caused some shading in the price of domestic, although the latter is still openly quoted at 37¼c. per lb.

Potash

Bichromate of Potash—Resale lots are not large enough to play an important part. Makers are pretty well in control of the market and while they are not finding an active outlet for their goods, they are holding prices on a steady level with 11¼c. per lb. as the inside price.

Caustic Potash — Offerings of imported were more free and there was no difficulty in finding sellers at 7½c. per lb. The market has been in a position where holders at times try to advance quotations but buyers are interested only at the lower price levels and sellers have not been firm when actual buying orders were in sight. The fact that concessions were granted made quotations irregular and 7¼c. per lb. was given as the basis of some sales.

Carbonate of Potash — Small lot transactions were the rule and prices remained easy under the quiet trading movement. Prices are held at 6⅝c. per lb. for 90-95 per cent; 6½c. per lb. for 80-85 per cent; 7½c. per lb. for 80-85 per cent hydrated.

Chlorate of Potash—Domestic grades have been well maintained at 8½c. per lb., f.o.b. works, but imported grades were pressed for sale and holders were open to bids with reports that sales were put through at 7c. per lb.

Cyanide of Potash—Very little interest was shown by consumers and present trading is of small volume. Goods of standard make are well held and prices are quoted on an unchanged basis

of 47c. to 50c. per lb. according to seller and quantity.

Permanganate of Potash—The market appears to have settled at a level of 17c. per lb. as that price was generally quoted throughout the week. Offerings at 17c., however, were free and in spite of reports that the market abroad was higher there was an evident desire on the part of local holders to move stocks.

Prussiate of Potash—There was no interest in red prussiate and prices were nominally quoted at 65@70c. per lb. according to seller. Yellow prussiate likewise has found but little call and prices show a range according to seller with 31@34c. per lb. representing views of sellers.

Sodas

Bichromate of Soda—Withdrawals on old orders have lessened in volume but a seasonal movement is still reported and stocks are not accumulating in sellers' hands. New business is largely for jobbing quantities. Prices show a slight range according to seller with 8½c. per lb. works as the lowest price heard.

Caustic Soda — The announcement that quotations would be made on a flat basis was well received in the trade. A good movement from works is still reported by producers and in some quarters it is stated that June deliveries were larger than those for May. Export business has fallen off and f.a.s. prices are hardly firm in the absence of buying orders. The quotation for standard makes f.a.s. is 3.30c. per lb. Exports for the 10 months ending April were 94,568,136 lb. as compared with 90,535,694 lb. for the corresponding period last year. Contract prices are held at 3.16½c. per lb. in drums, at works. Ground and flake are quoted at 3.60c. in drums, works.

Cyanide of Soda—Arrivals of foreign cyanide continue to reach the local market. Lower prices for prussiate are said to have cut down demand for cyanide in some industries but a fairly steady call is still reported. Prices continue to show a range according to seller and 20c. to 22c. per lb. covers the range heard. The inside price was not free but offerings at 20½c. per lb. were available throughout the period. Domestic goods hold at 22@23c. per lb.

Fluoride of Soda—Some fair sized lots have changed hands at 8½c. per lb. Stocks on hand have been reduced and some reports say it is easier to secure small lots than large amounts at the lower price level. In some quarters 8¾@9c. per lb. is asked.

Nitrate of Soda—The market is still featured by comparatively low prices for spot material as compared with futures. First hands have been milling spot holdings at $2.42½ per 100 lb., in fact some sales are said to have been made at $2.40 per 100 lb. The lower price levels have not stimulated buying to any extent and the market is described as quiet. On futures no prices are given for shipments into the new year and July-Sept. is offered at $2.45 per 100 lb., October at $2.47½ per 100 lb., November at $2.50 per 100 lb., and December at $2.52½ per 100 lb.

"Chem. & Met." Weighted Index of Chemical Prices

Base = 100 for 1913-14

This week	174.28
Last week	175.39
July, 1918	277.00
July, 1919	231.00
July, 1920	274.00
July, 1921	148.00
July, 1922	156.00

Further weakness in crude cottonseed oil, refined glycerine and copper sulphate caused the drop of 111 points in the week's index number.

Nitrite of Soda—Producers of domestic nitrite continue to offer on a basis of 7¼c. per lb., at works. There is, however, some difference in price according to seller. Imported nitrite is easy in tone with 7½@7¾c. per lb. representing the current market.

Prussiate of Soda—Prominent producers have reduced prices for July shipments to 15½c. per lb. but this price has been met with still lower quotations on the imported material and the latter was offered during the week as low as 14c. per lb. Demand has improved a little but even at the low prices now quoted there is no consistent call for supplies.

Miscellaneous Chemicals

Arsenic—Holders in some cases have given up hopes for higher prices and were pressing material for sale. There were offerings on spot at 12c. per lb. and prices ranged from that level up to 13¾c. per lb. Shipments range from 10c. to 12c. per lb. according to seller and position with very little interest in distant positions.

Bleaching Powder—The market has been featured by an announcement from one of the leading producers that on shipments over the third quarter of the year the price would be $1.75 per 100 lb. f.o.b. works. Prices have been easy for some weeks and this action places the quoted price down to the level at which business has been done.

Calcium Arsenate—There is little if any change in the market. Buying is only moderately active and some reports say that goods held at southern points are being resold at low prices and help to take away business from first hands. Prices are too irregular to admit of naming any figure as the market price. Asking prices range from 13c. to 17c. per lb. according to seller. While many factors in the trade are hopeful of improvement in demand and in prices, there are others who think the market will remain comparatively quiet with prices irregular and subject to selling pressure.

Copper Sulphate—Demand is easing off and the market was less firm during the week. Domestic grades are offered at 5½@5¾c. per lb. depending on seller and quantity. In some quarters 5.60c. per lb. is the inside price for large crystals. Imported grades were offered freely at 4¾c. per lb. on spot and shipments were quoted at 4½c. per lb.

Formaldehyde — Producers have openly quoted 14¾c. per lb. and sales are reported at 14½c. per lb. and it is probable that the latter figure still can be done. Trading is not active and sellers appear to be more willing to meet buyers' ideas.

Paris Green—Demand has not been heavy for this season and some sellers appear to have considerable quantities on hand. Price concessions have been granted and buyers have been able to secure supplies at 25c. per lb. in bulk.

Tin Oxide—Lower prices for the metal have made their influence felt in this market and prices were marked down 1c. per lb., making the selling price 47c. per lb.

Alcohol

Scattered lots of imported denatured alcohol came on the market, but otherwise the situation showed little change. Leading producers continued to quote on the basis of 35c. per gal. on the special No. 1 formula, in drums, and 41c. per gal, in barrels, carload lots. Ethyl spirits met with limited call, the U.S.P. grade holding around $4.70 per gal., in barrels. A shipment of butyl spirits arrived here from abroad. The market for butyl alcohol was nominally unchanged at 26@27c. per gal. Methanol was steady on curtailed production. Producers quote the 95 per cent at $1.18 per gal., and the 97 per cent at $1.20 per gal.

Canada Increases Export Trade in Chemicals

The total value of Canada's imports of chemicals and allied products during the fiscal year ended March, 1923, was $25,793,101, approximately $1,000,000 more than the previous year but $12,094,348 less than in 1921, according to a report issued by the Bureau of Statistics.

Chemical exports from Canada have considerably increased in the last year. The total value of these in the fiscal year just ended was $14,046,940, as compared with $9,506,170 in 1922 and $20,366,279 in 1921.

During the last 2 years there has been little variation in the amount of chemicals brought into the country from the United Kingdom and the United States. The total value of the imports from the United Kingdom in each of the 2 years was in the neighborhood of $3,500,000, while chemical imports from the United States in the fiscal year just ended totaled $18,347,545, exactly $200 more than the previous year.

Exports of inorganic chemicals increased from $4,541,696 in 1922 to $6,871,625 in the last fiscal year. The gain was principally in soda and sodium compounds.

Coal-Tar Products

Cresylic Acid Lower—Benzene Offered Freely by Smaller Producers —Phenol Unsettled—Salicylates Easier

OFFERINGS of cresylic acid increased, and with no important buying in progress prices eased off in more than one direction. Several shipments arrived from British ports, and with some new production also a factor, competition for business was keen. Traders said that material is coming through from the other side on a larger scale and importers hope to land future consignments on a more liberal interpretation of the tariff act. Phenol was offered freely for forward delivery and with talk of lower "contract" prices the market at the close was in a very unsettled condition. Spot U.S.P. material was offered down to 40c. per lb. during the past week. On futures nominal quotations ranged from 26@28c. per lb., depending upon the seller and quantity. Salicylates were quiet and one of the largest producers of U.S.P. acid, according to reports, will soon come down to the 40c. basis. Benzene was plentiful and smaller producers appeared anxious for business, standing ready to shade the market. Leading producers continued to hold it at 25c. per gal., tanks, f.o.b. works. Solvent naphtha was firm under limited stocks and continued steady buying interest. Naphthalene was barely steady on spot. No important price changes occurred in the intermediate division.

Aniline Oil—Makers continued to quote on the carload lot basis of 16c. per lb., but with demand moderate only some traders appeared willing to offer broken lots at this figure.

Benzaldehyde—Quiet prevailed in the market for benzaldehyde, but producers held out for 75c. per lb. on the technical variety. The undertone was not so firm as a short time ago.

Benzene—Production is ample, and with no improvement in the motor fuel situation prices at the close were considered easy. Smaller producers were anxious for business and intimated that they stood ready to offer supplies at concessions. Leading producers admitted that business left much to be desired, but saw no reason for reducing prices and continued to quote on the tank car basis of 25c. per gal. for the 90 per cent grade, f.o.b. works. The pure held at 27c. per gal., tank car basis, f.o.b. works.

Creosote—A cargo of creosote arrived from the United Kingdom last week. The market was steady.

Cresylic Acid—There were offerings of cresylic acid for immediate shipment at prices ranging from 95c.@$1 per gal., a decline of almost 10c. in a week. The offerings were liberal and on nearby stuff it was possible to do down to 80c. per gal. Domestic producers offered cresylic acid on contract at less than 80c. per gal., but restricted business with regular customers only. During the past week 348 drums of cresylic acid arrived from foreign ports.

Naphthalene—Included in the imports last week were 1,472 bags from Rotterdam and 390 bags from Hamburg. The spot market for flake naphthalene was easy and prices named ranged from 7½@7¾c. per lb. Demand was slow. Crude offerings from abroad increased and lower prices obtained in several quarters. On forward business in the crude the market settled at 2¼@2¾c. per lb., c.i.f. New York. Intermediate makers showed no buying interest.

Phenol—The spot market for U.S.P. phenol was unsettled. Scattered lots came out at prices ranging from 40@45c. per lb., but no important buying developed. Talk of lower offerings for future delivery served to check the buying on the part of larger consumers. Leading interests offered phenol to regular customers at 28c. per lb., forward delivery, and, according to reports, new producers stood ready to shade this figure on a firm bid.

Salicylic Acid—The market eased off in some quarters on rather quiet business. Several factors offered U.S.P. acid at 40c. per lb., and it was reported that the largest producer stood ready to meet this figure. The easier situation in phenol was instrumental in checking demand and with competition keen prices at the close were barely steady.

Solvent Naphtha—Offerings were scant and the sold-up condition of the market caused prices to hold firm. Leading producers report the market as at 27c. per gal., tank car basis, f.o.b. works.

Xylene—On contract it was possible to pick up the pure grade at 70c. per lb. On spot prices held around the 90c. level.

Switzerland Increases Indigo Exports

Exports of aniline dyes from Switzerland in 1922 aggregated 3,872,800 kg., with a value of 55,257,000 francs, which is only a slight change compared with 1921, according to a report compiled by Vice-Consul William H. Mathes at Zurich. On the other hand, exports of artificial indigo made heavy gains, totaling 3,460,800 kg., with a value of 13,158,000 francs, as compared with 1,182,000 kg., valued at 9,497,000 francs in the previous year.

The principal purchaser of artificial indigo was China, which took large quantities, valued at 9,948,000 francs, for her cheap cotton fabrics. Although the quantity of exported indigo almost trebled, the value did not increase correspondingly, as competition in the world markets has been keen. The second best customer for artificial indigo from Switzerland was Japan, which purchased 165,000 kg., valued at 2,260,000 francs.

Financial Notes

The Corn Products Refining Co. has declared an extra dividend of $1.50 on the common stock in addition to regular quarterly dividends of $1.50 on common and $1.75 on preferred.

The Procter & Gamble Co. has declared a regular dividend of 5 per cent and an extra dividend of 4 per cent on the common stock. This company has paid an extra dividend of 4 per cent every year since 1913.

The New Jersey Zinc Co. will pay an extra dividend of 2 per cent in addition to the regular quarterly dividend of 2 per cent. The extra dividend is payable July 10 and the regular dividend Aug. 10.

The Allied Chemical & Dye Corporation has declared a regular quarterly dividend of $1 on common stock, payable Aug. 1 to stock of record July 13.

The Diamond Match Co. has called its outstanding 7½ per cent debentures for payment Nov. 1.

Latest Quotations on Industrial Stocks

	Last Week	This Week
Air Reduction	60⅝	60
Allied Chem. & Dye	67¼	65⅛
Allied Chem. & Dye pfd	108½	106¾
Am. Ag. Chem.	16	14¾
Am. Ag. Chem. pfd	40¾	35¾
American Cotton Oil	5½	5
American Cotton Oil pfd	14	16
Am. Drug Synd.	5	5
Am. Linseed Co.	18¼	18⅞
Am. Linseed pfd.	40	40
Am. Smelting & Refining	57¼	53¾
Am. Smelting & Refining pfd.	97	93
Archer-Daniels Mid. Co., w i.	30	29¾
Archer-Dan. Mid. Co., pfd.	98½	98
Atlas Powder	165	*160
Atlas Powder (new)	54½	54
Casein Co. of Am.	*60	*60
Certain-Teed Products	*33	*33¼
Commercial Solvents	29	28
Corn Products	130¼	123
Corn Products pfd.	117½	117½
Davison Chem.	30½	31½
Dow Chem Co.	*42	*42
Du Pont de Nemours	116¼	107
Du Pont de Nemours db	85	83½
Freeport-Texas Sulphur	11	10
Glidden Co.	7½	*7½
Grasselli Chem.	*133	*133
Grasselli Chem. pfd.	*105	*105
Hercules Powder	*100	*105
Hercules Powder pfd.	*102	*104
Heyden Chem.	2	1¾
Int'l Ag. Chem. Co	3½	3
Int'l Ag. Chem. pfd.	10⅞	11
Int'l Nickel	13¼	12⅝
Int'l Nickel pfd.	82	82
Int'l Salt	*80	*89½
Mathieson Alkali	42¾	37½
Merck & Co.	*87	*86
National Lead	114	112¾
National Lead pfd.	110	110
New Jersey Zinc	155	153
Parke, Davis & Co.	78	*78
Pennsylvania Salt	85	*79¾
Procter & Gamble	*130	*130
Sherwin-Williams	29	29
Sherwin-Williams pfd.	*101	*101
Tenn. Copper & Chem.	8⅞	9
Texas Gulf Sulphur	57	57½
Union Carbide	54½	53¼
United Drug	80	78
U. S. Industrial Alcohol	48	44
U. S. Industrial Alcohol pfd.	*100	*100
Va.-Car. Chem Co.	8¼	6¼
Va.-Car. Chem. pfd	25½	17

*Nominal. Other quotations based on last sale.

Vegetable Oils and Fats

Cottonseed Declines—Linseed for Shipment Lower—Coconut Easier on Pacific Coast—Extra Tallow Weak

THE past week brought out lower prices for most of the technical oils, while an easier situation also prevailed in the edible group. Buyers refused to anticipate in their wants, although it was generally stated that stocks of fats and oils were not burdensome and should the movement of finished products continue at a fair rate replacement orders should soon appear in volume. Reports concerning the cotton crop have not been optimistic.

Cottonseed Oil—Selling of July oil was the feature on the market. Refiners sold the July position and bought August and September. On Thursday 2,000 barrels of July oil were tendered and promptly stopped. According to well informed operators some sort of a "settlement" was worked in the option market. Actual demand for cottonseed oil was moderate only and it is probable that consumption for June will not come up to the total for May. July oil on the Produce Exchange sold around 10¾c., while December was nominal at 8.66c. per lb. Lard in Chicago, July option, settled around 10¾c. per lb. Immediate crude in the southeast closed at 9¼c. per lb., tank cars, f.o.b. mills, while nothing under 7c. per lb. was named on October forward business. The first preliminary estimate on this season's cotton crop will be issued by the Department of Agriculture early in the week. The boll weevil is making headway and weather conditions are not at all favorable for the development of the plant. Most of the private estimates issued during the past week spoke of a yield of not more than 11,000,000 bales, while less than a fortnight ago there were quite a number of so-called crop experts who were firm in the belief that the production would reach at least 12,000,000 bales. Bleachable oil settled at 9⅞c. asked, buyers' tanks, f.o.b. Texas, with no sales. Lard compound held at 12¾@13c. per lb., carload basis.

Linseed Oil—Orders were few and confined almost entirely to nearby material. The market was unsettled, especially in futures. Holdings of both seed and oil were not large, but with new orders not coming along so freely, there was some inclination to shade prices. The Argentine seed markets came in slightly lower, but in the northwest offerings continued light and prices held up well contrasted with the weakness in other grains. Spot oil sold at prices ranging from $1.08@$1.10 per gal., carload lots, cooperage included. On second-half of July deliveries there were sellers at $1.05@$1.06 per gal., with August at $1.03, October at 96c. and November-April at 90c., carload lots or more, cooperage basis. Imported oil on spot sold at $1.00 per gal., duty paid. No estimates have come out on the northwest flaxseed crop, but traders believe that production will be larger than last season. Argentine offerings were not heavy and with more than 34,000,000 bushels already shipped "bulls" take the stand that not much more than 6,000,000 bushels should be available for the balance of the year. The "bears" still hold to the opinion that the final returns will show that the Argentine produced a total of more than 50,000,000 bushels, in which event enough seed will be available to supply this country and Europe. Indian offerings were liberal, with the United Kingdom as a steady buyer. The market for linseed cake for export was quiet, yet crushers were unwilling to shade $37 per ton, f.a.s. New York.

China Wood Oil—A tank of July shipment from the coast was offered at 21c. per lb. Most traders held out for 22c. for September forward. Spot oil in New York settled at 25½c., in bbl., with July-August at 23½@24c. per lb.

Coconut Oil—Ceylon type oil sold at 7¾c. per lb., sellers' tanks coast, a decline of ¼c. Three cars changed hands. Additional offerings came out at this figure late in the week.

Corn Oil—Several cars of crude sold at 9¼c. per lb., tanks, f.o.b. Chicago. Crude on spot, New York, was offered at 11¼c. per lb., in bbl.

Palm Oils—The decline in tallow hampered business. Lagos oil held nominally at 7c. per lb., with Niger at 6⅝@6¾c. per lb.

Rapeseed Oil—Sales of refined were reported down to 78c. per gal. The market was unsettled at the close.

Sesame Oil—Distressed material was cleaned up and refined on spot settled at 11¾@12c. per lb., cooperage basis. On futures there were offerings at 11½c. per lb.

Soya Bean Oil—Distressed parcels came on the market and sold close to the 9c. level, tank car basis, f.o.b. New York, duty paid. Crude oil for shipment, in bulk, settled around 6.80c. per lb. On the Pacific coast 9c. was asked, sellers' tanks, duty paid, prompt shipment.

Fish Oils—Fishing for menhaden improved all along the coast, but producers of oil were not free sellers, being sold up for some weeks ahead. The nominal price for crude menhaden was 48@50c. per gal., tank cars, f.o.b. fish factory. Newfoundland tanked cod oil was lowered to 65c. asked.

Tallow, Etc.—Extra tallow sold at 6⅝c. per lb, f.o.b. plant, a drop of ⅛c. for the week. Oleo oil, No. 1, closed at 12c. per lb. Oleo stearine settled at 8⅞c. per lb. Yellow grease held at 6¼@6½c. per lb., as to acidity.

Miscellaneous Materials

Carbon Black—The spot situation was a little easier, because of increased production, and quotations at the close ranged from 18@22c. per lb. on the lower grades.

Glycerine—The market was unsettled, both in the west and here. Price shading was reported in the chemically pure grade and actual business went through around 16c. per lb., in drums, carload basis. Most refiners were asking from 16½@17c. per lb. for the chemically pure. Last sales in dynamite went through at 14c. per lb., in drums, carload basis, with a possibility of additional business at this figure. Crude soap-lye, basis 80 per cent, loose, sold down to 9½c. per lb.

Naval Stores—Lower prices obtained for turpentine, the market settling around 95c. per gal., which compares with $1.04 per gal. a week ago. Receipts in the south have been liberal, while business, both in an export and a domestic way, was not up to normal. The recent sharp advance in prices brought out renewed buying interest in turpentine substitutes. Rosins were inactive and barely steady, although prices underwent little change. The lower grades closed at $5.80@$5.90 per bbl.

Shellac—The market eased off, T.N. selling down to 55c. per lb., ex-dock. Demand was slow and sentiment in nearly all quarters favored lower prices. The Calcutta market was unsettled throughout the week. Bleached, bonedry, settled on spot at 67@68c. per lb. Superfine orange was offered at 60c. per lb.

Lithopone—Domestic producers maintained prices on the 7c. basis. Demand was less active, but with no change in the barytes situation, the undertone remained steady.

White Lead—There was an easier market for the metal, but corroders announced no price changes in the lead pigments. Business was fair. The undertone was barely steady and rumors of lower prices persist. The fact that leading producers are willing to accept business on a guaranty against decline basis tends to stabilize. Standard dry white lead held at 9⅝c. per lb., in casks, carload lots.

Zinc Oxide—Business was inactive and with lower prices prevailing for the metal, as well as the ore, the undertone was not so firm. Leading producers continued to name 8c. as the inside price on the American process, lead free oxide. Exports of zinc oxide for the 10 months ending with April 30 amounted to 8,687,630 lb., as against 5,352,566 lb. for the corresponding period a year ago.

London Tallow Auction

At the weekly tallow auction, held in London June 27, the offerings consisted of 1,354 casks. Sales amounted to 544 casks and prices realized were unchanged.

Imports at the Port of New York

June 22 to June 28

ACIDS—**Boracic**—250 bg., Leghorn, Pacific Coast Borax Co. **Cresylic**—140 dr., Liverpool, Order; 50 dr., Liverpool, W. E. Jordan & Bros.; 32 dr., Glasgow, Guaranty Trust Co.; 50 dr., Glasgow, Baltimore & Ohio R.R.; 17 dr., Glasgow, Order; 59 dr., Rotterdam, Lunham & Moore. **Citric**—300 csk., Palermo, Order. **Lactic**—31 cs., Bremen, Mallinckrodt Chemical Works; 23 csk., Bremen, Order. **Oxalic**—30 csk., Rotterdam, R. W. Greeff & Co. **Phosphoric**—84 cs., Hamburg, W. A. Brown & Co. **Tartaric**—100 keg, London, Order; 1,020 csk., Palermo, Order.

ALCOHOL—47 csk. butyl, Bordeaux, Commercial Solvents Co.; 19 csk. do., Bordeaux, Order; 19 dr. amyl, Rotterdam, New York Trust Co.; 27 bbl. denatured, Arecibo, M. Feigel Bros.; 55 bbl. do., Arecibo, C. Estevas.

AMMONIUM—20 csk. carbonate, Liverpool, Brown Bros. & Co.; 976 cs. perchlorate, Genoa, Order.

AMYL-ACETATE—9 cs., Havre, Houbigant, Inc.

ANTIMONY OXIDE—250 bg., Hankow, China Hide & Produce Co.; 654 bg., Hankow, Farmers' Loan & Trust Co.

ANILINE COLOR—13 csk., Havre, Ciba Co.; 19 csk., Havre, Geigy Co.; 4 csk., Havre, Sandoz Chem. Works.

ANTHRACINE—57 csk., Rotterdam, Lunham & Moore.

ARSENIC—195 bbl., Tampico, American Metal Co.; 67 dr., Beirâ, Order; 27 csk., Bordeaux, Order; 200 csk., Hamburg, Ore & Chemical Corp.; 120 csk., Hamburg, Order.

ASBESTOS—938 bg., Southampton, W. D. Crumpton & Co.

BARIUM CHLORIDE—69 csk., Hamburg, Order.

BARIUM BINOXIDE — 62 dr., Havre, Mallinckrodt Chem. Works.

BARYTES—200 bg. Bremen, New York Trust Co.; 400 bg., Bremen, L. H. Butcher & Co.

BLANC FIXE — 75 csk., Newcastle-on-Tyne, Ellerman's Wilson Line.

CASEIN — 60 bbl., Southampton, New York Trust Co.; 242 sk., Bordeaux, National City Bank; 110 sk., Bordeaux, New York Trust Co.; 192 bg., St. Nazaire, Order.

CAMPHOR—200 cs., Shanghai, Am. Trading Co.

CHALK—500 bg., Antwerp, Bankers' Trust Co.; 1,000,000 kilos, Dunkirk, Order.

CHINA CLAY—514 tons, Fowey, Moore & Munger; 1,048 tons, Fowey, English China Clay Sales Co.; 346,876 kilos, Rotterdam, Williams & Terhune.

CHEMICALS—1,000 bg., Bremen, A. Klipstein & Co.; 100 carboys, Bremen, Pfaltz & Bauer; 150 csk., Newcastle-on-Tyne, E. Hill's Son & Co.; 4 cs., Hamburg, Eimer & Amend; 100 csk., Havre, A. Klipstein & Co.; 200 csk., Marseilles, Pomeroy & Fischer; 60 pkg., Hamburg, Hummel & Robinson; 185 pkg., Hamburg, Roessler & Hasslacher Chem. Co.; 200 bg., Hamburg, Jungmann & Co.; 39 dr., Hamburg, Order.

CHROME ORE—1,000 tons, Beirâ, E. J. Lavino & Co.

COLORS—10 csk., Bremen, Sigmund Ullman Co.; 10 bbl., Hamburg, Order.

COAL-TAR DISTILLATE—69 dr., Liverpool, Order; 10 dr., Glasgow, Guaranty Trust Co.

CREOSOTE OIL—5,000 tons (bulk), Hull, Order.

COPRA—115 bg., Jamaica, Franklin Baker Co.

CREAM TARTAR — 25 csk., Bordeaux, R. W. Greeff & Co.

DIVI-DIVI—899 bg., Curacao, Selma Merc. Corp.

DYESTUFFS—5 bbl., Genoa, Am. Exchange Nat'l Bank; 14 pkg., Genoa, Order; 28 csk., Genoa, Bank of the Manhattan Co.; 24 csk., Genoa, Irving Bank-Col. Trust Co.; 35 bbl. aniline, Copenhagen, National Am. Bank.

EPSOM SALT—1,000 bg., Bremen, E. Suter & Co.

FLUORSPAR—547 bg., Hamburg, L. A. Salomon & Bros.

FERRO CHROME—19 csk., Bremen, Order; 100 cs., Havre, Int'l Ores & Metals Co.

FULLERS EARTH—450 bg., Bremen, B. F. Ducas & Co.

FUSEL OIL—11 bbl., Danzig, Order; 44 dr., Hamburg, Order; 2 dr., Dunkirk, Order; 8 dr., Rotterdam, N. Y. Trust Co.; 3 dr., Rotterdam, A. Hurst & Co.; 2 bbl., Graker, Order; 20 dr., Rotterdam, Order.

GLAUBER SALT—1 bbl., Bremen, E. Suter & Co.; 110 csk., Hamburg, E. M. Sergeant & Co.; 300 bg., Hamburg, A. J. Marcus, Inc.

GUMS—100 cs. damar, Batavia, Chemical National Bank; 100 cs. damar, Batavia, W. Schall & Co.; 1,269 bskt. and 71 cs. copal, Macassar, Irving Bank-Col. Trust Co.; 135 bskt. copal, Macassar, National City Bank; 601 bskt. copal, Macassar, Kidder-Peabody Accept. Corp.; 433 pkg. copal, Macassar, Brown Bros. & Co.; 148 bg. copal, Macassar, Am. Exchange Nat'l Bank; 4,520 pkg. do., Macassar, Order; 200 cs. damar, Tandjeng Priok, Order; 24 bg. copal, London, S. Winterbourne & Co.; 16 pkg. kauri, Williams Shipping Agency; 420 bg. damar and 100 bg. copal, Singapore, L. C. Gillespie & Sons; 70 bg. copal, Singapore, France, Campbell & Darling; 668 bg. damar and 160 bg. copal, Kidder, Peabody & Co.; 200 bg. copal, Singapore, Irving Bank-Col. Trust Co.; 210 bg. copal, Singapore, Guaranty Trust Co.; 380 pkg. copal and 83 cs. damar, Singapore, Order; 277 bg. copal, Antwerp, Order; 1,000 cs. damar, Padang, Order.

GAMBIER—511 cs., Singapore, Order.

GLYCERINE—70 dr., Marseilles, Order.

IRON OXIDE—55 csk., Hull, J. L. Smith & Co.; 23 csk., Liverpool, Reichard-Coulston, Inc.; 56 csk., Liverpool, J. A. McNulty; 42 pkg., Liverpool, Battery Park Nat'l Bank; 268 bbl. Malaga, C. K. Williams & Co.; 115 bbl., Malaga, Reichard-Coulston, Inc.; 200 bbl., Malaga, Hummel & Robinson Corp.; 100 bbl., Malaga, C. J. Osborn & Co.; 187 pkg., Malaga, National City Bank; 14 csk., Liverpool, Reichard-Coulston, Inc.

LITHOPONE—40 csk., Hamburg, Order.

MANGROVE BARK—6,003 bg., Beirâ, Bingham & Co.; 2,300 bg., Singapore, Order.

MAGNESITE—46,764 bg., Trieste, Harrison-Walker Refractories; 105 bbl., Rotterdam, Speiden-Whitfield Co.; 450 bbl., Rotterdam, Innis, Speiden & Co.; 9,600 bg., Madras, Order.

MAGNESIUM—20 dr. chloride, Liverpool, Carborundum Co.; 200 cs. citrate, Genoa, Order.

MINERAL WHITE—200 bg., Hull, L. A. Salomon & Bros.

MYROBALANS — 12,233 pkt., Calcutta, Order; 5,200 pkt., Calcutta, National City Bank.

NAPHTHALENE — 390 bg., Hamburg, Pacific Chemical Co.; 1,472 bg., Rotterdam, Lunham & Moore.

OCHER—800 csk., Marseilles, Reichard-Coulston, Inc.; 160 csk., Marseilles, J. L. Smith & Co.; 277 csk., Marseilles, Am. Exchange Nat'l Bank; 558 csk., Marseilles, Metropolitan Trust Co.

OILS—**Castor**—100 bbl., Hull, Philadelphia National Bank; 200 bbl., Hull, Order. **Cocoanut**—807 tons (bulk), Manila, Spencer Kellogg & Sons; 869 tons (bulk), Manila, Philippine Refining Corp. **Cod**—175 csk., St. Johns, R. Badcock & Co.; 25 dr., Bergen, Order. **Linseed**—290 bbl., Hull, J. C. Francesconi & Co.; 800 tons (bulk), Hull, Archer-Daniels Linseed Co.; 100 bbl., Hull, Order; 268 bbl., Manchester, Order. **Olive** (foots)—100 bbl., Messina, Chemical Nat'l Bank; 100 bbl., Catania, Order. **Olive** (industrial)—300 bbl., Marseilles, National City Bank. **Palm**—39 csk., Liverpool, Am. Express Co.; 208 csk., Liverpool, Niger Co.; 39 csk., Liverpool, Order; 68 butts, Rotterdam, W. Porter & Co.; 264 csk., Rotterdam, J. Holt & Co. **Palm Kernel**—100 bbl., Hull, Order. **Rapeseed**—100 bbl., Hull, Order. **Sesame**—146 bbl., Rotterdam, Nat'l City Bank. **Soya Bean**—791 tons (bulk) Dairen, Mitsubishi Shoji Kaisha.

OIL SEEDS—**Castor**—69,106 bg., Coconada, Order. **Linseed**—86,655 bg., Rosario, Spencer Kellogg & Sons; 23,681 bg., Buenos Aires, Spencer Kellogg & Sons; 56,096 bg., Buenos Aires, Order; 42,563 bg., Buenos Aires, Order.

PITCH—100 bbl., Hull, Order; 25 bbl., London, Order.

POTASSIUM SALTS — 25 csk. crystals, London, Mager, Sonderburg Co.; 4,500 bg. muriate, Hamburg, Potash Importing Corp.; 100 dr. permanganate, Hamburg, Roessler & Hasslacher Chem. Co.; 30 csk. salts, Hamburg, A. Klipstein & Co.; 150 bbl. chlorate, Marseilles, Asia Banking Corp.; 525 csk. chlorate, Marseilles, Order; 10 csk. oxalate, Rotterdam, R. W. Greeff & Co.; 5,500 bg. sulphate, Bremen, Potash Importing Corp.; 11,500 bg. muriate and 50 bbl. sulphate powder, Bremen, Potash Importing Corp.; 361 dr. caustic, Hamburg, E. Suter & Co.; 5,500 bg. sulphate, Hamburg, Potash Importing Co.

PYRIDINE—10 dr., Rotterdam, Lunham & Moore.

QUEBRACHO — 13,890 pcs., Santa Fe, Tannin Corp.; 1,080 bg. extract, Buenos Aires, National Bank of Commerce; 8,160 bg., Buenos Aires, Fourth Atlantic National Bank; 10,400 bg., Buenos Aires, Tannin Corp.; 14,621 bg., Buenos Aires, Beekman, Winthrop Co.

QUICKSILVER—15 flasks, Trieste A. H. Pickering; 80 flasks, Genoa, A. H. Pickering; 100 flasks, Leghorn, Order.

SAL AMMONIAC—15 bbl., Hamburg, P. Bauer & Co.

SHELLAC—110 cs., Bangkok, Order; 270 pkg., Calcutta, Brown Bros. & Co.; 595 pkg., Calcutta, Philadelphia National Bank; 450 bg., Calcutta, Chase National Bank; 1,825 bg. (refuse), Calcutta, Bank of the Manhattan Co.; 1,778 pkg., Calcutta, Order.

SIENNA—55 csk., Genoa, Order.

SODIUM SALTS — 24 csk. prussiate, Liverpool, H. J. Baker & Bro.; 2,115 cs. cyanide, Hamburg, Roessler & Hasslacher Chem. Co.; 100 cs. bromide, Hamburg, Nat'l Am. Bank; 120 cs. cyanide, Marseilles, Asia Banking Corp.; 168 cs. cyanide, Marseilles, National City Bank; 23 cs. prussiate, Liverpool, Order; 136 cs. cyanide, Havre, National City Bank; 3,459 bg. nitrate, Christiania, Order; 123 cs. cyanide, Havre, Asia Banking Corp.; 95,308 bg. nitrate (2,300 tons to be discharged at Norfolk), Iquique, Wessel, Duval & Co.

STARCH—1,000 bg. potato, Rotterdam, Stein, Hall & Co.

SUMAC—350 bg., Palermo, E. M. Sergeant & Co.; 700 bg., Palermo, Order; 100 bl., Palermo, Order.

TALC — 2,700 bg., Genoa, Italian Discount & Trust Co.; 350 bg., Genoa, Perfumes de Luxe; 250 bg., Genoa, Bankers' Trust Co.; 2,300 bg., Genoa, Order.

TARTAR—288 bg. crude, Lisbon, C. Pfizer & Co.; 1,087 sk., Marseilles, Tartar Chem. Co.; 255 csk., Marseilles, C. Pfizer & Co.; 341 pkg., Alicante, Tartar Chem. Works; 384 bg., Marseilles, C. Pfizer & Co.; 42 csk., Naples, Tartar Chemical Works.

TURMERIC—160 bg., Cochin, Order.

WAXES—1,500 bg. montan, Bremen, Order; 139 bl. bees, Lisbon, Banco Nac Uutromarino; 10 bg. bees, Constantinople, Order; 3 bl., Monte Christi, Vivini & Co.; 217 pkg. bees and 67 pkg. carnauba, Rio de Janeiro, Am. Trading Co.; 33 bg. bees, Rio de Janeiro, London & Brazilian Bank; 8 bl. bees, Ponce, A. Gonzales; 313 sk. montan, Hamburg, Knauth, Nachod & Kuhne.

WOOL GREASE — 150 bbl., Bremen, Pfaltz & Bauer.

WHITE LEAD—110 csk., Trieste, Fezandie & Sperrle.

WHITING—5,480 bg., Dunkirk, Taintor Trading Co.

ZINC OXILE — 216 pkg., Havre, Coty, Inc.

ZINC WHITE—250 bbl., Marseilles, National City Bank; 50 bbl., Marseilles, Order.

Current Prices in the New York Market

For Chemicals, Oils and Allied Products

THESE prices are for the spot market in New York City, but a special effort has been made to report American manufacturers' quotations whenever available. In many cases these are for material f.o.b. works or on a contract basis and these prices are so designated. Quotations on imported stocks are reported when they are of sufficient importance to have a material effect on the market. Prices quoted in these columns apply to large quantities in original packages.

General Chemicals

Acetone, drums	lb.	$0.25 -	.25½
Acid, acetic, 28%, bbl.	100 lb.	3.38 -	3.50
Acetic, 56%, bbl.	100 lb.	6.75 -	7.00
Glacial, 99½%, bbl.	100 lb.	12.00 -	12.50
Acetic anhydride, 85%, dr.	lb.	.38 -	....
Boric, bbl.	lb.	.10½-	
Citric, kegs	lb.	.49 -	.52
Formic, 85%	lb.	.14 -	.16
Gallic, tech.	lb.	.45 -	.50
Hydrofluoric, 52%, carboys	lb.	.11 -	.12
Lactic, 44%, tech., light, bbl.	lb.	.11½-	.12
22% tech., light, bbl.	lb.	.05½-	.06
Muriatic, 18° tanks	100 lb.	.90 -	1.00
Muriatic, 20°, tanks,	100 lb.	1.00 -	1.10
Nitric, 36°, carboys	lb.	.04½-	.05
Nitric, 42°, carboys	lb.	.06 -	.06½
Oleum, 20%, tanks	ton	18.50 -	19.00
Oxalic, crystals, bbl.	lb.	.13 -	.13½
Phosphoric, 50% carboys	lb.	.07½-	.08½
Pyrogallic, resublimed	lb.	1.50 -	1.60
Sulphuric, 60°, tanks	ton	11.00 -	11.00
Sulphuric, 60°, drums	ton	13.00 -	14.00
Sulphuric, 66°, tanks	ton	15.00 -	16.00
Sulphuric, 66° drums	ton	20.00 -	21.00
Tannic, U.S.P., bbl.	lb.	.65 -	.70
Tannic, tech., bbl.	lb.	.45 -	.50
Tartaric, imp., powd., bbl.	lb.	.35½-	.36
Tartaric, domestic, bbl.	lb.	.37½-	....
Tungstic, per lb.	lb.	1.10 -	1.20
Alcohol, butyl, drums, f.o.b. works	lb.	.26 -	.28
Alcohol ethyl (Cologne spirit), bbl.	gal.	4.75 -	4.95
Ethyl, 190 p'f. U.S.P., bbl.	gal.	4.70 -	....
Alcohol, methyl (see Methanol)			
Alcohol, denatured, 190 proof			
No. 1, special bbl.	gal.	.41 -	...
No. 1, 190 proof, special, dr.	gal.	.35 -	...
No. 1, 188 proof, bbl.	gal.	.42 -	...
No. 1, 188 proof, dr.	gal.	.36 -	...
No. 5, 188 proof, bbl.	gal.	.40 -	...
No 5, 188 proof, dr.	gal.	.34 -	...
Alum, ammonia, lump, bbl.	lb.	.03½-	.03¾
Potash, lump, bbl.	lb.	.02½-	.03½
Chrome, lump, potash, bbl.	lb.	.05½-	.05¾
Aluminum sulphate, com., bags	100 lb.	1.50 -	1.65
Iron free bags	lb.	.02½-	.02¾
Aqua ammonia, 26°, drums	lb.	.06½-	.07½
Ammonia, anhydrous, cyl.	lb.	.30 -	.30½
Ammonium carbonate, powd. casks, imported	lb.	.09½-	.10
Ammonium carbonate, powd. domestic, bbl.	lb.	.13 -	.14
Ammonium nitrate, tech., casks	lb.	.10 -	.11
Amyl acetate tech., drums	gal.	3.75 -	4.25
Arsenic, white, powd., bbl.	lb.	.13½-	.14
Arsenic, red, powd., kegs	lb.	.15½-	.16
Barium carbonate, bbl.	ton	70.00 -	75.00
Barium chloride, bbl.	ton	80.00 -	83.00
Barium dioxide, drums	lb.	.18 -	.18½
Barium nitrate, casks	....	.08 -	.08½
Blanc fixe, dry, bbl.	lb.	.04 -	.04½
Bleaching powder, f.o.b. wks., drums	100 lb.	1.75 -	1.90
Spot N. Y. drums	100 lb.	2.25 -	2.40
Borax, bbl.	lb.	.05½-	.05¾
Bromine, cases	lb.	.28 -	.30
Calcium acetate, bags	100 lb.	4.00 -	4.05
Calcium arsenate, dr.	lb.	.13 -	.16
Calcium carbide, drums	lb.	.05½-	.05¾
Calcium chloride, fused, drums	ton	22.00 -	23.00
Gran. drums	ton	28.00 -	30.00
Calcium phosphate, mono, bbl.	lb.	.06½-	.07
Camphor, cases	lb.	.86 -	.88
Carbon bisulphide, drums	lb.	.07 -	.07½
Carbon tetrachloride, drums	lb.	.09½-	.10
Chalk, precip.—domestic, light, bbl.	lb.	.04½-	.04¾
Domestic, heavy, bbl.	lb.	.03½-	.03¾
Imported, light, bbl.	lb.	.04½-	.05
Chlorine, liquid, tanks, wks.	lb.	.05½-	.05¾
Cylinders, 100 lb., wks	lb.	.06 -	.06½
Cylinders, 100 lb., spot	lb.	.09 -	....
Chloroform, tech., drums	lb.	.35 -	.38
Cobalt oxide, bbl.	lb.	2.10 -	2.25
Copperas, bulk, f.o.b. wks.	ton	20.00 -	21.00
Copper carbonate, bbl.	lb.	.19 -	.20
Copper cyanide, drums	lb.	.47 -	.50
Copper sulphate, dom., bbl.,	100 lb.	5.50 -	5.75
Imp. bbl.	100 lb.	5.00 -	5.25
Cream of tartar, bbl.	lb.	.25½-	.26½
Epsom salt, dom., tech., bbl.	100 lb.	1.90 -	2.15
Epsom salt, imp., tech., bags	100 lb.	.90 -	1.00
Epsom salt, U.S.P., dom., bbl.	100 lb.	2.50 -	2.60
Ether, U.S.P., resale, dr.	lb.	.13 -	.15
Ethyl acetate, 85%, drums	gal.	.80 -	.81
Ethyl acetate, pure (acetic ether, 98% to 100%)	gal.	.95 -	1.00
Formaldehyde, 40%, bbl.	lb.	$0.14½-	$0.15
Fullers earth—imp., powd., net	ton	30.00 -	32.00
Fusel oil, ref., drums	gal.	..... -	.....
Fusel oil, crude, drums	gal.	3.75 -	4.00
Glaubers salt, wks., bags	100 lb.	1.20 -	1.40
Glaubers salt, imp., bags	100 lb.	.90 -	.95
Glycerine, c.p., drums extra	lb.	.16 -	.16½
Glycerine, dynamite, drums	lb.	.14 -	.14½
Glycerine, crude 80%, loose	lb	.09½-	.09¾
Iodine, resublimed	lb.	4.55 -	4.65
Iron oxide, red, casks	lb.	.12 -	.18
Lead:			
White, basic carbonate, dry, casks	lb.	.09¾-	.10
White, basic sulphate, casks	lb.	.09½-	.....
White, in oil, kegs	lb.	.12½-	.14
Red, dry, casks	lb.	.11½-	.12
Red, in oil, kegs	lb.	.13½-	.15
Lead acetate, white crys., bbl.	lb.	.14 -	.14½
Brown, broken, casks	lb.	.13 -	.13½
Lead arsenate, powd., bbl.	lb.	.23 -	.24
Lime-Hydrated, bbl.	per ton	16.80 -	17.00
Lime, Lump, bbl.	280 lb.	3.63 -	3.65
Litharge, comm., casks	lb.	.10½-	.11
Lithophone, bags	lb.	.07 -	.07½
in bbl.	lb.	.07½-	.07¾
Magnesium carb., tech., bags	lb.	.08½-	.08¾
Methanol, 95%, bbl.	gal.	1.18 -	1.20
Methanol, 97%, bbl.	gal.	1.20 -	1.22
Nickel salt, double, bbl.	lb.	.10½-	....
Nickel salts, single, bbl.	lb.	.11½-	....
Phosgene	lb.	.60 -	.75
Phosphorus, red, cases	lb.	..... -	.....
Phosphorus, yellow, cases	lb.	.35 -	.40
Potassium bichromate, casks	lb.	.11 -	.11½
Potassium bromide, gran., bbl.	lb.	.19 -	.20
Potassium carbonate, 80-85%, calcined, casks	lb.	.06½-	.06¾
Potassium chlorate, powd.	lb.	.07½-	.08
Potassium cyanide, drums	lb.	.17 -	.52
Potassium, first sorts, cask	lb.	.08½	.08½
Potassium hydroxide (caustic potash) drums	lb.	.07½-	.09
Potassium iodide, cases	lb.	3.65 -	3.75
Potassium nitrate, bbl.	lb.	.06½-	.07½
Potassium permanganate, drums	lb.	.17 -	.17½
Potassium prussiate, red, casks	lb.	65 -	.67
Potassium prussiate, yellow, casks	lb.	31 -	.33
Salammoniac, white, gran., casks, imported	lb.	.06½-	.06¾
Salammoniac, white, gran., bbl., domestic	lb.	.07½-	.07¾
Gray, gran., casks	lb.	.08 -	.09
Salsoda, bbl.	100 lb.	1.20	1.40
Salt cake (bulk)	ton	26.00 -	28.00
Soda ash, light, 58% flat, bags, contract	100 lb.	1.45 -	1.50
Soda ash, light, 58%, flat, bags, resale	100 lb.	1.70 -	1.75
Soda ash, dense, bags, contract, basis 58%	100 lb.	1.51 -	....
Soda ash, dense, in bags, resale	100 lb.	1.85 -	1.90
Soda, caustic, 76%, solid, drums	100 lb.	3.16½-	....
Soda, caustic, ground and flake, contracts	100 lb.	3.60 -	3.85
Soda, caustic, ground and flake, resale	100 lb.	3.72½-	.....
Sodium acetate, works, bags	lb.	.05½-	.06½
Sodium bicarbonate, bbl.	100 lb.	2.00 -	2.50
Sodium bichromate, casks	lb.	.08½-	.09
Sodium bisulphate (niter cake)	ton	6.00 -	7.00
Sodium bisulphite, powd., U.S.P., bbl.	lb.	.04½-	.04¾
Sodium chlorate, kegs	lb.	.06½-	.07
Sodium chloride	long ton	12.00 -	13.00
Sodium cyanide, cases	lb.	.20 -	.23
Sodium fluoride, bbl.	lb.	$0.08½-	$0.10½
Sodium hyposulphite, bbl.	lb.	.02½-	.03
Sodium nitrite, casks	lb.	.07½-	.07¾
Sodium peroxide, powd., cases	lb.	.28 -	.30
Sodium phosphate, dibasic, bbl.	lb.	.03½-	.04
Sodium prussiate, yel. drums	lb.	.14 -	.15½
Sodium salicylic, drums	lb.	.47 -	.52
Sodium silicate (40°, drums)	100 lb.	.75 -	1.15
Sodium silicate (60°, drums)	100 lb.	1.75 -	2.00
Sodium sulphide, fused, 60-62% drums	lb.	.04½-	.04¾
Sodium sulphite, crys., bbl.	lb.	.03½-	.03¾
Strontium nitrate, powd., bbl.	lb.	.12½-	.13
Sulphur chloride, yel drums	lb.	.04½-	.05
Sulphur, crude	ton	18.00 -	20.00
At mine, bulk	ton	16.00 -	18.00
Sulphur, flour, bag	100 lb.	2.25 -	2.35
Sulphur, roll, bag	100 lb.	2.00 -	2.10
Sulphur dioxide, liquid, cyl.	lb.	.08 -	.08½
Talc—imported, bags	ton	30.00 -	40.00
Talc—domestic powd., bags	ton	18.00 -	25.00
Tin bichloride, bbl.	lb.	.12½-	.13
Tin oxide, bbl.	lb.	.47 -	....
Tin crystals, bbl.	lb.	.34½-	.35
Zinc carbonate, bags	lb.	.14 -	.14½
Zinc chloride, gran, bbl.	lb.	.06½-	.06¾
Zinc cyanide, drums	lb.	.37 -	.38
Zinc oxide, lead free, bbl.	lb.	.08 -	.08½
5% lead sulphate, bags	lb.	.07½-	......
10 to 35% lead sulphate, bags	lb.	.07 -	......
French, red seal, bags	lb.	.09½-	......
French, green seal, bags	lb.	.10½-	......
French, white seal, bbl.	lb.	.12 -	......
Zinc sulphate, bbl.	100 lb.	2.50 -	3.00

Coal-Tar Products

Alpha-naphthol, crude, bbl.	lb.	$0.62 -	$0.75
Alpha-naphthol, ref., bbl.	lb.	.70 -	.80
Alpha-naphthylamine, bbl.	lb.	.35 -	37
Aniline oil, drums	lb.	.16 -	.16½
Aniline salts, bbl.	lb.	.23 -	.24
Anthracene, 80%, drums	lb.	.75 -	1.00
Anthracene, 80%, imp., drums, duty paid	lb.	.70 -	.75
Anthraquinone, 25%, paste, drums	lb.	.70 -	.75
Benzaldehyde U.S.P., carboys	lb.	1.40 -	1.45
tech. drums	lb	75	.....
Benzene, pure, water-white, tanks and drums	gal.	.27 -	.32
Benzene, 90%, tanks & drums	gal.	.25 -	.30
Benzene, 90%, drums, resale	gal.	.28 -	.32
Benzidine base, bbl.	lb.	.80 -	.85
Benzidine sulphate, bbl.	lb.	.70 -	.75
Benzoic acid, U.S.P., kegs	lb.	.75 -	80
Benzoate of soda, U.S.P., bbl.	lb.	.57 -	.65
Benzyl chloride, 95-97%, ref., drums	lb.	.45 -	...
Benzyl chloride, tech., drums	lb.	.30 -	.35
Beta-naphthol, tech., bbl.	lb.	.21½-	.22½
Beta-naphthylamine, tech.	lb.	.80 -	.90
Cresol, U.S.P., drums	lb.	.25 -	.29
Ortho-cresol, drums	lb.	.28 -	.32
Cresylic acid, 97%, resale, drums	gal.	1.00 -	.....
95-97%, drums, resale	gal.	.95 -	.....
Dichlorbenzene, drums	lb.	.07 -	.09
Diethylaniline, drums	lb.	.50 -	.60
Dimethylaniline, drums	lb.	.41 -	.42
Dinitrobenzene, bbl.	lb.	.19 -	.20
Dinitroclorbenzene bbl.	lb.	.22 -	.23
Dinitronaphthalen, bbl.	lb.	.30 -	.32
Dinitrophenol, bbl.	lb.	.35 -	.40
Dinitrotoluene, bbl.	lb.	.20 -	.22
Dip oil, 25%, drums	gal.	.25 -	.30
Diphenylamine, bbl.	lb.	.50 -	.52
H-acid, bbl.	lb.	.75 -	.80
Meta-phenylenediamine, bbl.	lb.	1.00 -	1.05
Michlers ketone, bbl.	lb.	3.00 -	3.50
Monochlorbenzene, drums	lb.	.08 -	.10
Monoethylaniline, drums	lb.	.95 -	1.10
Naphthalene, flake, bbl.	lb.	.07½-	.07¾
Naphthalene, balls, bbl.	lb.	.08 -	.08½
Naphthionate of soda, bbl.	lb.	.58 -	.65
Naphthionic acid, crude, bbl.	lb.	.55 -	.60
Nitrobenzene, drums	lb.	.10 -	.12
Nitro-naphthalene, bbl.	lb.	.30 -	.35
Nitro-toluene, drums	lb.	.13½-	.14½
N-W acid, bbl.	lb.	1.25 -	1.30
Ortho-amidophenol, kegs	lb.	2.30 -	2.35
Ortho-dichlorbenzene, drums	lb.	.17 -	.20
Ortho-nitrophenol, bbl.	lb.	.90 -	.92
Ortho-nitrotoluene, drums	lb.	.10 -	.12
Ortho-toluidine, bbl.	lb.	.13½-	.14½
Para-amidophenol, base, kegs	lb.	1.20 -	1.30
Para-amidophenol, HCl, kegs	lb.	1.25 -	1.35
Para-dichlorbenzene, bbl.	lb.	.17 -	.20
Paranitroaniline, bbl.	lb.	.70 -	.75
Para-nitrotoluene, bbl.	lb.	.60 -	.65
Para-phenylenediamine, bbl.	lb.	1.45 -	1.50
Para-toluidine, bbl.	lb.	.90 -	.95
Phthalic anhydride, bbl.	lb.	.35 -	.38
Phenol, U.S.P., resale, dr.	lb.	.42 -	.45
Picric acid, bbl.	lb.	.20 -	.22
Pyridine, dom., drums	gal.	nominal	

Pyridine, imp., drums	gal.	$4 00 – $4 25
Resorcinol, tech., kegs	lb.	1.50 – 1.60
Resorcinol, pure, kegs	lb.	2.25 – ....
R-salt, bbl	lb.	.55 – .60
Salicylic acid, tech., bbl	lb.	.37 – .42
Salicylic acid, U.S.P., bbl	lb.	.40 – ....
Solvent naphtha, water-white, tanks	gal.	.27 – ....
Crude, tanks	gal.	.24 – ....
Sulphanilic acid, crude, bbl	lb.	.18 – .20
Thiocarbanilide, kegs	lb.	.35 – .38
Toluidine, kegs	lb.	1.20 – 1.30
Toluidine, mixed, kegs	lb.	.30 – .35
Toluene, tank cars	gal.	.30 – .35
Toluene, drums	gal.	.34 – .36
Xylidines drums	lb.	.49 – .50
Xylene, pure, drums	gal.	.65 – .90
Xylene, com., drums	gal.	.37 – ....
Xylene, com., tanks	gal.	.32 – ....

Naval Stores

Rosin B-D, bbl	280 lb.	$5.80 – ....
Rosin E-I, bbl	280 lb.	5.85 – ....
Rosin K-N, bbl	280 lb.	6.00 – 6.10
Rosin W.G.-W.W., bbl	280 lb.	6.25 – 7.25
Wood rosin, bbl	280 lb.	5.90 – 6.00
Turpentine, spirits of, bbl	gal.	.95 – .96
Wood, steam dist., bbl	gal.	.86 – .87
Wood, dest. dist., bbl	gal.	.62 – .63
Pine tar pitch, bbl	200 lb.	.... – 6.00
Tar, kiln burned, bbl	500 lb.	.... – 13.00
Retort tar, bbl	500 lb.	.... – 12.00
Rosin oil, first run, bbl	gal.	.45 – ....
Rosin oil, second run, bbl	gal.	.48 – ....
Rosin oil, third run, bbl	gal.	.52 – ....
Pine oil, steam dist	gal.	.70 – ....
Pine oil, pure, dest. dist	gal.	.65 – ....
Pine tar oil, ref	gal.	.48 – ....
Pine tar oil, crude, tanks f.o.b. Jacksonville, Fla	gal.	.32 – .32½
Pine tar oil, double ref., bbl	gal.	.... – .75
Pine tar, ref., thin, bbl	gal.	.... – .25
Pinewood creosote, ref., bbl	gal.	.... – .52

Animal Oils and Fats

Degras, bbl	lb.	$0 03¾ – $0.04¼
Grease, yellow, bbl	lb.	.06½ – .06¾
Lard oil, Extra No. 1, bbl	gal.	.90 – .92
Neatsfootoil 20 deg. bbl	gal.	1.30 – ....
No. 1, bbl	gal.	.92 – .94
Oleo Stearine	..	.08¼ – .08½
Red oil, distilled, d.p. bbl	lb.	.09½ – .10
Saponified, bbl	lb.	.09½ – .10
Tallow, extra, loose	lb.	.06½ – ....
Tallow oil, acidless, bbl	gal.	.94 – .96

Vegetable Oils

Castor oil, No. 3, bbl	lb.	$0.14 – ....
Castor oil, No. 1, bbl	lb.	.14½ – ....
Chinawood oil, bbl	lb.	.25½ – .26
Coconut oil, Ceylon, bbl	lb.	.09¼ – .09½
Ceylon, tanks, N.Y.	lb.	.08½ – ....
Coconut oil, Cochin, bbl	lb.	.09¼ – .09¾
Corn oil, crude, bbl	lb.	.12½ – ....
Crude, tanks, (f.o.b. mill)	lb.	.09½ – ....
Cottonseed oil, crude (f.o.b. mill), tanks	lb.	.09½ – ....
Summer yellow, bbl	lb.	.12½ – .12¾
Winter yellow, bbl	lb.	.13 – ....
Linseed oil, raw, car lots, bbl	gal.	1.08 – ....
Raw, tank cars (dom.)	gal.	1.03 – ....
Boiled, cars, bbl. (dom.)	gal.	1.10 – ....
Olive oil, denatured, bbl	gal.	1.05 – 1.10
Sulphur, (foots) bbl	lb.	.07½ – ....
Palm, Lagos, casks	lb.	.07 – ....
Niger casks	lb.	.06½ – ....
Palm kernel, bbl	lb.	.08½ – .08¾
Peanut oil, crude, tanks (mill)	lb.	.12 – ....
Peanut oil, refined, bbl	lb.	.16 – .16½
Perilla, bbl	lb.	.15¼ – .15½
Rapeseed oil, refined, bbl	gal.	.78 – ....
Rapeseed oil, blown, bbl	gal.	.85 – ....
Sesame, bbl	lb.	.11½ – .12
Soya bean (Manchurian), bbl	lb.	.11½ – ....
Tank, f.o.b. Pacific coast	lb.	.09 – ....
Tank, (f.o.b. N.Y.)	lb.	.09½ – ....

Fish Oils

Cod, Newfoundland, bbl	gal.	$0.65 – ....
Menhaden, light pressed, bbl	gal.	.76 – ....
White bleached, bbl	gal.	.78 – ....
Blown, bbl	gal.	.82 – ....
Crude, tanks (f.o.b. factory)	gal.	.48 – .50
Whale No. 1 crude, tanks, coast	lb.	.... – ....
Winter, natural, bbl	gal.	.76 – .78
Winter, bleached, bbl	gal.	.79 – .80

Oil Cake and Meal

Coconut cake, bags	ton	$26.00 – $28.00
Copra, sun dried, bags, (c.i.f.)	lb.	.05 – ...
Sun dried Pacific coast	lb.	.04½ – ...
Cottonseed meal, f.o.b. mills	ton	38.00 – ....
Linseed cake, bags	ton	37.00 – ....
Linseed meal, bags	ton	39.00 – ....

Dye & Tanning Materials

Albumen, blood, bbl	lb.	$0.45 – $0.50
Albumen, egg, tech, kegs	lb.	.95 – .97
Cochneal, bags	lb.	.33 – .35
Cutch, Borneo, bales	lb.	.04½ – .04¾
Cutch, Rangoon, bales	lb.	.13 – .13½
Dextrine, corn, bags	100 lb.	3.84 – 4.25
Dextrine, gum, bags	100 lb.	4.14 – 4.34
Divi-divi, bags	ton	38.00 – 39.00
Fustic, sticks	ton	30.00 – 35.00
Fustic, chips, bags	lb.	.04 – .05
Logwood, sticks	ton	26.00 – 30.00
Logwood, chips, bags	lb.	.02½ – .03½
Sumac, leaves, Sicily, bags	ton	70.00 – 72.00
Sumac, ground, bags	ton	$65 00 – $67.00
Sumac, domestic, bags	ton	40.00 – 42.00
Starch, corn, bags	100 lb.	3.22 – 3.49
Tapioca flour, bags	lb.	.06½ – .07

Extracts

Archil, conc., bbl	lb.	$0.18 – $0.22
Chestnut, 25% tannin, tanks	lb.	.02 – .03
Divi-divi, 25% tannin, bbl	lb.	.04 – .05
Fustic, crystals, bbl	lb.	.20 – .22
Fustic, liquid, 42°, bbl	lb.	.08 – .09
Gambier, liq., 25% tannin, bbl.	lb.	.08 – .09
Hematine crys., bbl	lb.	.14 – .18
Hemlock, 25% tannin, bbl	lb.	.03¾ – .04¼
Hypernic, solid, drums	lb.	.24 – .26
Hypernic, liquid, 51°, bbl	lb.	.09½ – .10½
Logwood, crys., bbl	lb.	.17 – .18
Logwood, liq., 51°, bbl	lb.	.08½ – .09
Quebracho, solid, 65% tannin, bbl	lb.	.04¼ – .05
Sumac, dom., 51°, bbl	lb.	.06½ – .07

Dry Colors

Blacks-Carbongas, bags, f.o.b. works, spot	lb.	$0.18 – $0.22
Lampblack, bbl	lb.	.12 – .40
Mineral, bulk	ton	35.00 – 45.00
Blues-Bronze, bbl	lb.	.55 – .60
Prussian, bbl	lb.	.55 – .60
Ultramarine, bbl	lb.	.08 – .35
Browns, Sienna, Ital., bbl	lb.	.06 – .14
Sienna, Domestic, bbl	lb.	.03½ – .04
Umber, Turkey, bbl	lb.	.04 – .04¼
Greens-Chrome, C.P.Light, bbl	lb.	.32 – .34
Chrome, commercial, bbl	lb.	.12 – .12½
Paris, bulk	lb.	.25 – .28
Reds, Carmine No. 40, tins	lb.	4.50 – 4.70
Oxide red, casks	lb.	.10 – .14
Para toner, kegs	lb.	1.00 – 1.10
Vermilion, English, bbl	lb.	1.25 – 1.28
Yellow, Chrome, C.P. bbls	lb.	.21 – .22
Ocher, French, casks	lb.	.02½ – .03

Waxes

Bayberry, bbl	lb.	$0.30 – $0.32
Beeswax, crude, bags	lb.	.21½ – .22½
Beeswax, refined, light, bags	lb.	.32 – .34
Beeswax, pure white, cases	lb.	.40 – .41
Candellila, bags	lb.	.20 – .21
Carnauba, No. 1, bags	lb.	.42 – .43
No. 2, North Country, bags	lb.	.23 – .23½
No. 3, North Country, bags	lb.	.18 – .18½
Japan, cases	lb.	.15¾ – .16
Montan, crude, bags	lb.	.04¼ – .04½
Paraffine, crude, match, 105-110 m.p.	lb.	.04 – .04¼
Crude, scale 124-126 m.p., bags	lb.	.02¾ – .03
Ref., 118-120 m.p., bags	lb.	.03 – .03½
Ref., 125 m.p., bags	lb.	.03½ – .03¾
Ref, 128-130 m.p., bags	lb.	.03¾ – .03¾
Ref., 133-135 m.p., bags	lb.	.04½ – .04¾
Ref., 135-137 m.p., bags	lb.	.05¼ – .05½
Stearic acid, sgle pressed, bags	lb.	.12¾ – .13
Double pressed, bags	lb.	.13¼ – .13½
Triple pressed, bags	lb.	.14½ – .14¾

Fertilizers

Ammonium sulphate, bulk, f.o.b. works	100 lb.	$3.20 – $3.25
F.a.s. double bags	100 lb.	3.55 – 3.65
Blood, dried, bulk	unit	4.00 – ....
Bone, raw, 3 and 50, ground	ton	27.00 – 30.00
Fish scrap, dom., dried, wks.	unit	3.75 – ....
Nitrate of soda, bags	100 lb.	2.45 – 2.52½
Tankage, high grade, f.o.b. Chicago	unit	3.60 – 3 70
Phosphate rock, f.o.b. mines, Florida pebble, 68-72%	ton	$4.00 – $4.50
Tennessee, 78-80%	ton	8.00 – 8.25
Potassium muriate, 80%, bags	ton	34.55 – ....
Potassium sulphate, bags basis 90%	ton	43.67 – ....
Double manure salt	ton	25.72 – ....
Kainit	ton	7.22 – ....

Crude Rubber

Para—Upriver fine	lb.	$0.26½ – ....
Upriver coarse	lb.	.24 – ....
Upriver caucho ball	lb.	.25 – ....
Plantation—First latex crepe	lb.	.25 – ....
Ribbed smoked sheets	lb.	.25 – ....
Brown crepe, thin, clean	lb.	.24¼ – ....
Amber crepe No. 1	lb.	.24½ – ....

Gums

Copal, Congo, amber, bags	lb.	$0.12 – $0.13
East Indian, bold, bags	lb.	.23 – .23½
Manila, pale, bags	lb.	.20 – .20½
Pontinak, No. 1 bags	lb.	.20 – .20½
Damar, Batavia, cases	lb.	.27½ – .28
Singapore, No. 1, cases	lb.	.32 – .33
Singapore, No. 2, cases	lb.	.21½ – .22
Kauri, No. 1, cases	lb.	.65 – .67
Ordinary chips, cases	lb.	.21 – .22
Manjak, Barbados, bags	lb.	.09 – .09¼

Shellac

Shellac, orange fine, bags	lb.	$0.58 – ....
Orange superfine, bags	lb.	.60 – ....
A. C. garnet, bags	lb.	.57 – ....
Bleached, bonedry	lb.	.68 – ....
Bleached, fresh	lb.	.56 – ....
T. N., bags	lb.	.55 – ....

Miscellaneous Materials

Asbestos, crude No. 1, f.o.b., Quebec	sh. ton	$500.00 – ....
Asbestos, shingle, f.o.b., Quebec	sh. ton	$65.00 – $85.00
Asbestos, cement, f.o.b., Quebec	sh. ton	20.00 – 25.00
Barytes, grd., white, f.o.b. mills, bbl	net ton	16.00 – 20.00
Barytes, grd., off-color, f.o.b. mills bulk	net ton	13.00 – 15.00
Barytes, floated, f.o.b. St. Louis, bbl	net ton	28.00 – ....
Barytes, crude f.o.b. mines, bulk	net ton	10.00 – 11.00
Casein, bbl., tech	lb.	.15½ – .17
China clay (kaolin) crude, f.o.b. Ga	net ton	7.00 – 9.00
Washed, f.o.b. Ga	net ton	8.00 – 9.00
Powd., f.o.b. Ga	net ton	14.00 – 20.00
Crude f.o.b. Va	net ton	8.00 – 12.00
Ground, f.o.b. Va	net ton	14.00 – 20.00
Imp., lump, bulk	net ton	15.00 – 20.00
Imp., powd	net ton	45.00 – 50.00
Feldspar, No. 1 pottery	long ton	6.00 – 7.00
No. 2 pottery	long ton	4.00 – 5.50
No. 1 soap	long ton	7.00 – 7.50
No. 1 Canadian, f.o.b. mill	long ton	20.00 – 22.00
Graphite, Ceylon, lump, first quality, bbl	lb.	.06½ – ....
Ceylon, chip, bbl	lb.	.05½ – ....
High grade amorphous crude	ton	15.00 – 35.00
Gum arabic, amber, sorts, bags	lb.	.14½ – .15
Gum tragacanth, sorts, bags	lb.	.48 – .56
No. 1, bags	lb.	1.50 – 1.60
Kieselguhr, f.o.b. Cal	ton	40 00 – 42.00
F.o.b. N. Y	ton	50.00 – 55.00
Magnesite, crude, f.o.b. Cal	ton	14.00 – 15.00
Pumice stone, imp., casks	lb.	.03 – .05½
Dom., lump, bbl	lb.	.05 – .05¾
Dom., ground, bbl	lb.	.06 – .07
Silica, glass sand, f.o.b. Ind	ton	2.00 – 2.50
Silica, sand blast, f.o.b. Ind	ton	2.50 5.00
Silica, amorphous, 250-mesh, f.o.b. Ill	ton	17.00 – 17.50
Silica, bldg. sand, f.o.b. Pa	ton	2.00 – 2.75
Soapstone, coarse, f.o.b. Vt., bags	ton	7.00 – 8.00
Talc, 200 mesh, f.o.b., Vt., bags	ton	6.50 – 9.00
Talc, 200 mesh, f.o.b. Ga., bags	ton	7.00 – 9.00
Talc, 200 mesh, f.o.b. Los Angeles, bags	ton	16.00 – 20.00

Mineral Oils

Crude, at Wells

Pennsylvania	bbl.	$3 00 – 3.25
Corning	bbl.	1 70 – ......
Cabell	bbl.	1 71 – ......
Somerset	bbl.	1 55 – ......
Illinois	bbl.	1 97 – ......
Indiana	bbl.	1 98 – ......
Kansas and Oklahoma, 28 deg.	bbl.	1.20 – ......
California, 35 deg. and up	bbl.	1.04 – ......

Gasoline, Etc.

Motor gasoline, steel bbls	gal.	$0.21½ – ......
Naphtha, V. M. & P. deod, steel bbls	gal	.20½ – ......
Kerosene, ref. tank wagon	gal.	.14 – ......
Bulk, W. W. export	gal.	.07 – ......
Lubricating oils:		
Cylinder, Penn., dark	gal	.20 – .22
Bloomless, 30@31 grav	gal	.18½ – .20½
Paraffin, pale	gal	.24 – .26
Spindle, 200, pale	gal.	.21 – .22
Petrolatum, amber, bbls	lb.	.05 – .05¼
Paraffine wax (see waxes)		

Refractories

Bauxite brick, 56% Al_2O_3, f o.b. Pittsburgh	ton	$45–50
Chrome brick, f.o.b. Eastern shipping points	ton	50–52
Chrome cement, 40-50% Cr_2O_3	ton	23–27
40-45% Cr_2O_3, sacks, f.o.b. Eastern shipping points	ton	23.00
Fireclay brick, 1st. quality, 9-in. shapes, f.o.b. Ky. wks.	1,000	40–46
2nd. quality, 9-in. shapes, f.o.b. wks.	1,000	36–41
Magnesite brick, 9-in. straight (f.o.b. wks.)	ton	65–68
9-in. arches, wedges and keys	ton	80–85
Scraps and splits	ton	85
Silica brick, 9-in. sizes, f.o.b. Chicago district	1,000	48–50
Silica brick, 9-in. sizes, f.o.b. Birmingham district	1,000	48–50
F.o.b. Mt. Union, Pa.	1,000	42–44
Silicon carbide refract. brick, 9-in.	1,000	1,100.00

Ferro-Alloys

Ferrotitanium, 15-18% f.o.b. Niagara Falls, N. Y.	ton	$200.00 – $225.00
Ferrochromium, per lb. of Cr, 6-8% C	lb.	.11½ .11¾
4-6% C	lb.	.12 – .13
Ferromanganese, 78-82% Mn, Atlantic seabd. duty paid	gr. ton	125.00 – ....
Spiegeleisen, 19-21% Mn.	gr. ton	40.00 – ....
Ferromolybdenum, 50-60% Mo, per lb Mo	lb.	2.00 – 2.50
Ferrosilicon, 10-15%	gr. ton	48.00 – 50.00
50%	gr. ton	95.00 – ....
75%	gr. ton	150.00 – 160.00

Ferrotungsten, 70-80%, per lb. of W	lb.	\$0.88 – \$0.90
Ferro-uranium, 35-50% of U. per lb. of U	lb.	4.50 –........
Ferrovanadium, 30-40%, per lb. of V	lb.	3.50 – 3.75

Ores and Semi-finished Products

Bauxite, dom. crushed, dried, f.o.b. shipping points	ton	\$6.00 – \$9.00
Chrome ore Calif. concentrates, 50% min. Cr_2O_3	ton	22.00 – 23.00
C.i.f. Atlantic seaboard	ton	20.50 – 24.00
Coke, fdry., f.o.b. ovens	ton	5.75 – 6.25
Coke, furnace, f.o.b. ovens	ton	5.50 – 6.00
Fluorspar, gravel, f.o.b. mines' Illinois	ton	20.00 – 21.50
Ilmenite, 52% TiO_2	lb.	.01¼– .01½
Manganese ore, 50% Mn, c.i.f. Atlantic seaport	unit	.35 –........
Manganese ore, chemical (MnO_2)	ton	80.00 – 85.00
Molybdenite, 85% MoS_2, per lb. MoS_2, N. Y.	lb.	.65 – .70
Monazite, per unit of ThO_2, c.i.f., Atl. seaport	lb.	.06 – .08
Pyrites, Span., fines, c.i.f. Atl. seaport	unit	.11½– .12
Pyrites, Span., furnace size, c.i.f. Atl. seaport	unit	.11½– .12
Pyrites, dom. fines, f.o.b. mines, Ga.	unit	.12
Rutile, 95% TiO_2	lb.	.12 –........
Tungsten, scheelite, 60% WO_3 and over, per unit WO_3	unit	8.50 – 8.75
Tungsten, wolframite, 60% WO_3 and over, per unit WO_3	unit	8.00 – 8.25
Uranium ore (carnotite) per lb. of U_3O_8	lb.	3.50 – 3.75
Uranium oxide, 96% per lb. U_3O_8	lb.	2.25 – 2.50
Vanadium pentoxide, 99%	lb.	12.00 – 14.00
Vanadium ore, per lb. V_2O_5	lb.	1.00 –........
Zircon, washed, iron free, f.o.b. Pablo, Fla.	lb.	.04½– .13

Non-Ferrous Materials

	Cents per Lb
Copper, electrolytic	14⅛-14¼
Aluminum, 98 to 99%	26-27½
Antimony, wholesale, Chinese and Japanese	6¾- 7¼
Nickel, virgin metal	27-29
Nickel, ingot and shot	30-32
Monel metal, shot and blocks	32.00
Monel metal, ingots	38.00
Monel metal, sheet bars	45.00
Tin, 5-ton lots, Straits	38.75
Lead, New York, spot	7.00
Lead, E. St. Louis, spot	6.65
Zinc, spot, New York	6.05
Zinc, spot, E. St. Louis	5.70

Other Metals

Silver (commercial)	oz.	\$0.64½
Cadmium	lb.	1.00
Bismuth (500 lb. lots)	lb.	2.55
Cobalt	lb.	3.00-3.25
Magnesium, ingots, 99%	lb.	1.25–.....
Platinum	oz.	116.00
Iridium	oz.	275.00@300.00
Palladium	oz.	80.00
Mercury	75 lb.	67.00@68.00

Finished Metal Products

	Warehouse Price Cents per Lb.
Copper sheets, hot rolled	24.25
Copper bottoms	29.75
Copper rods	25.25
High brass wire	19.37½
High brass rods	17.00
Low brass wire	21.10
Low brass rods	22.00
Brazed brass tubing	24.25
Brazed bronze tubing	29.00
Seamless copper tubing	25.25
Seamless high brass tubing	23.50

OLD METALS—The following are the dealers' purchasing prices in cents per pound:

Copper, heavy and crucible	11.60@11.8
Copper, heavy and wire	11.50@11.6
Copper, light and bottoms	10.00@10.1
Lead, heavy	5.75@ 6.0
Lead, tea	3.50@ 3.7
Brass, heavy	6.50@ 6.7
Brass, light	5.75@ 6.0
No. 1 yellow brass turnings	6.75@ .70
Zinc	3.75@ 4.2

Structural Material

The following base prices per 100 lb. are for structural shapes 3 in. by ¼ in. and larger, and plates ¼ in. and heavier, from jobbers' warehouses in the cities named:

	New York	Chicago
Structural shapes	\$3.29	\$3.14
Soft steel bars	3.19	3.04
Soft steel bar shapes	3.19	3.04
Soft steel bands	3.29	3.19
Plates, ¼ to 1 in. thick	3.29	3.14

Technical Societies, Trade Associations and Commercial Organizations

IT IS our privilege to present herewith, for the first time, a compilation of the various technical and commercial organizations in the chemical engineering and related fields. An effort has been made in each case to give the name and address of the secretary or other responsible official. It is realized, of course, that the first appearance of such a compilation cannot be at once complete and accurate in all its detail. For that reason *Chem. & Met.* welcomes additions or corrections in order that when the revised list is published at the beginning of our next volume, it will be of maximum usefulness to our readers.

Address the Editor, *Chemical & Metallurgical Engineering*, 10th Ave. at 36th St., New York City.

Amer. Assn. for the Advancement of Science. Sec., Dr. Burton E. Livingston, Smithsonian Inst. Bldg., Washington, D. C.

Amer. Assn. of Cereal Chemists. Pres., S. J. Lawellin, 508 Paris Bldg., Winnipeg, Man., Canada.

Amer. Assn. of Engrs. Sec., C. E. Drayer, 63 East Adams St., Chicago, Ill.

Amer. Assn. of Flint and Lime Glass Mfrs. Sec., John Kunzler, House Bldg., Pittsburgh, Pa.

Amer. Assn. of Ice & Refrigeration Engrs. Sec., L. C. Smith, 163 W. Washington St., Chicago, Ill.

Amer. Assn. of Operating Engrs. Sec., H. C. Bristol, Calderwood, Tenn.

Amer. Assn. of Refrigeration. Sec., J. F. Nickerson, 421 S. Dearborn St., Chicago, Ill.

Amer. Assn. of Textile Chemists & Colorists. Sec., Walter E. Hadley, 5 Mountain Ave., Maplewood, N. J.

Amer. Bakers Assn. Sec., Dr. H. E. Barnard, 1135 Fullerton Ave., Chicago, Ill.

Amer. Ceramic Society. Sec., Ross C. Purdy, Lord Hall, Ohio State Univ., Columbus, Ohio.

American Chemical Society. Sec., Dr. Charles L. Parsons, 1709 G St., N.W., Washington, D. C.

Amer. Concrete Institute. Sec., Harvey Whipple, 1807 E. Grand Blvd., Detroit, Mich.

Amer. Concrete Pipe Assn. Sec., M. W. Loving, 111 W. Washington St., Chicago, Ill.

Amer. Electrochemical Soc. Sec., Dr. C. G. Fink, Columbia Univ., New York.

Amer. Electro-Platers' Soc. Sec., Frank J. Hanlon, 216 N. Jefferson St., Chicago, Ill

Amer. Engineering Standards Committee. Sec., P. G. Agnew, 29 W. 39th St., New York.

Amer. Face Brick Assn. Sec., R. D. T. Hollowell, 130 N. Wells St., Chicago, Ill.

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Amer. Gas Assn. Sec.-Mgr., Oscar Fogg, 342 Madison Ave., New York.

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Amer. Inst. of Consulting Engrs. Sec., Col. F. A. Molitor, 143 Liberty St., New York.

Amer. Inst. of Electrical Engrs. Sec., F. L. Hutchinson, 29 W. 39th St., New York.

Amer. Inst. of Fertilizer Chemists. Sec.-Treas., W. J. Gascoyne, Jr., 27 S. Gay St., Baltimore, Md.

Amer. Inst. of Mining & Metallurgical Engrs. Sec., Frederick F. Sharpless, 29 W. 39th St., New York.

Amer. Iron & Steel Institute. Sec., E. A. S. Clarke, 40 Rector St., New York.

Amer. Leather Chemists Assn. Sec., H. C. Reed, 22 E. 16th St., New York.

Amer. Malleable Castings Assn. Pres., S. L. Smith, vice-pres. Natl. Malleable Castings Co., Cleveland, Ohio.

Amer. Mfrs. Assn. of Products From Corn. Sec., Dr. W. C. Cutler, LaSalle St., Chicago, Ill.

Amer. Manufacturers' Export Assn. Sec., Maurice B. Bean, 160 Broadway, New York.

Amer. Metric Assn. Sec., Howard Richards, Jr., 156 5th Ave., New York.

Amer. Mining Congress. Sec., J. F. Callbreath, 841 Munsey Bldg., Washington, D. C.

Amer. Oil Chemists' Society. Sec., Thomas B. Caldwell, Wilmington, N. C.

Amer. Oil Men's Assn. Sec., Melville C. Hill, Congress Hotel, Chicago, Ill.

Amer. Paper & Pulp Assn. Pres., Walter J. Reybold, vice-pres. B. D. Rising Paper Co., Housatonic, Mass.

Amer. Peat Soc. Sec.-Treas., Charles Knap, 2 Rector St., New York.

Amer. Petroleum Inst. Sec., R. L. Welch, 15 W. 44th St., New York.

Amer. Physical Soc. Sec., D. C. Miller, Case School of Applied Science, Cleveland, Ohio.

Amer. Pig Iron Assn. Pres., Theodore W. Friend, treas. Clinton Iron & Steel Co., Pittsburgh, Pa.

Amer. Pulp & Paper Mill Supts. Assn. Sec., P. C. Barrett, 10 Regent Bldg., Kalamazoo, Mich.

Amer. Society of Agricultural Engrs. Sec., Raymond Olney, Power Farming Press, St. Joseph, Mich.

Amer. Society of Civil Engrs. Sec., John H. Dunlap, 29 W. 39th St., New York.

Amer. Soc. for Heating & Ventilating Engrs. Sec., Casin W. Obert, 29 W. 39th St., New York.

Amer. Soc. of Mechanical Engrs. Sec., Calvin W. Rice, 29 W. 39th St., New York.

Amer. Soc. of Refrigerating Engrs. Sec., William H. Ross, 154 Nassau St., New York.

Amer. Soc. of Safety Engrs. Sec., F. A. Doody, 29 W. 39th St., New York.

Amer. Soc. for Steel Treating. Sec., W. H. Eisenman, 4600 Prospect Ave., Cleveland, Ohio.

Amer. Soc. for Testing Materials. Sec.-Treas., C. L. Warwick, 1315 Spruce St., Philadelphia Pa.

Amer. Welding Soc. Sec., Miss M. M. Kelly, 33 W. 39th St., New York.

Amer. Wood Preservers Assn. Sec., P. R. Hicks, 1146 Otis Bldg., Chicago, Ill.

Amer. Zinc Inst. Sec., Stephens S. Tuthill, 27 Cedar St., New York.

Associated Cooperage Industries of Amer. Sec., C. G. Hirt, B20 Railway Exchange Bldg., St. Louis, Mo.

Associated Tile Mfrs. Sec., F. W. Walker. Beaver Falls Pa.

Assn. of Amer. Steel Manufacturers. Sec., J. O. Leech, c/o Carnegie Steel Co., Pittsburgh, Pa.

Assn. of British Chemical Mfrs., Gen-Mgr. & Sec., W. G. U. Woolcock, 166, Piccadilly, London, W. 1, England.

Assn. of Iron and Steel Electrical Engrs. Sec., John F. Kelly, 1007 Empire Bldg., Pittsburgh, Pa.

Assn. of Official Agricultural Chemists. Sec., W. W. Skinner, Box 290, Pennsylvania Ave. Station. Washington, D. C.

Assn. of Scientific Apparatus Makers of the U. S. A. Sec., J. M. Roberts, Central Scientific Co., Chicago, Ill.

Assn. of Wood-Using Industries. Sec., William B. Baker, 531 Monadnock Bldg., Chicago, Ill.

Biscuit & Cracker Mfrs. Assn. Sec., R. T. Stokes, 90 West Broadway, New York.

British Assn. for the Advancement of Science, Berlington House, Piccadilly, London, W. 1, England.

British Cast Iron Research Assn. Sec., Thomas Vickers Central House, New St., Birmingham, England.

Canadian Engineering Standards Assn. Sec., R. J. Durley, Room 112, West Block, Ottawa, Ont., Canada.

Canadian Inst. of Chemistry. Sec., L. E. Westman, 57 Queen St., W., Toronto, Ont., Canada.

Canadian Inst. of Mining & Metallurgy. Sec., G. C. Mackenzie, 603 Drummond Bldg., Montreal, Canada.

Canadian National Clay Products Assn. Sec., Gordon C. Keith, 435 Grace St., Toronto, Ont., Canada.

Canadian Pulp & Paper Assn. Sec., Edward Beck, Room 700, Drummond Bldg., Montreal, Que., Canada.
Canadian Society of Forest Engrs. Sec., Roland D. Craig, Forestry Branch, Dept. of the Interior, Ottawa, Canada.
Ceramic Society, Stoke-on-Trent, England.
Cercle de la Chimie. Pres., P. Blondel, 54 Rue de Turbigo, Paris, France.
Chemical Equipment Assn. Sec., Roberts Everett, 1328 Broadway, New York.
Chemical, Metallurgical & Mining Society of South Africa, Inc. Sec., H. A. G. Jeffreys, Scientific & Technical Club, 100 Fox St., Johannesburg, Transvaal, South Africa.
Chemists' Club. Sec., H. G. Sidebottom, 52 E. 41st St., New York.
Circle of Scientific, Technical & Trade Journalists. Hon. Sec., Leon Gaster, 32 Victoria St., Westminster, London, S. W. 1, England.
Clay Products Assn. Sec., George C. D. Lenth, Chamber of Commerce Bldg., Chicago, Ill.
Common Brick Mfrs. Assn. of Amer. Sec., Ralph P. Stoddard, Cleveland Discount Bldg., Cleveland, Ohio.
Compressed Air Society. Sec., C. H. Rohrbach, 50 Church St., New York.
Compressed Gas Mfrs. Assn. Sec., Otto S. King, 120 Broadway, New York.
Copper & Brass Research Assn. Sec., George A. Sloan, 25 Broadway, New York.
Deutsche Chem. Ges., Sigismundstr, 4, W. 10, Berlin, Germany.
Deutsche Zuckerindustrie, Dessauer Str., 18, Berlin, S.W. 11, Germany.
Drop Forge Supply Assn. Pres., Hollinshead N. Taylor, 300 Chestnut St., Philadelphia, Pa.
Eastern Clay Products Assn. Sec., H T. Shelley, 906 Colonial Trust Bldg., Philadelphia, Pa.
Engineering Foundation. Director, Alfred D. Flinn, 29 W. 39th St., New York.
Engineering Inst. of Canada. Sec., Fraser S. Keith, 176 Mansfield St., Montreal, Que., Canada.
Faraday Society. 10 Essex St., Strand, London, W.C. 2, England.
Federated Amer. Engineering Societies. Sec., L. W. Wallace, 26 Jackson Pl., Washington, D. C.
Franklin Inst. of the State of Pa. Sec., Dr. R. B. Owens, 15 S. 7th St., Philadelphia, Pa.
Glass Container Assn. of Amer. Sec., H. J. Booth, C. L. Fiaccus Glass Co., Pittsburgh, Pa.
Hawaiian Sugar Planters' Assn., P. O. Box 411, Honolulu, Hawaii.
Illuminating Engineering Society. Gen. Sec., Samuel G. Hibben, 29 W. 39th St., New York.
Insecticide & Disinfectant Mfrs. Assn., Inc. Sec., Arthur Claassen, Claassen Murfit Co., 1714 N. Mascher St., Philadelphia, Pa.
Institute of Makers of Explosives. Pres., George C. King, King Powder Co., Cincinnati, Ohio.
Institute of Amer. Meat Packers. Vice-Pres., C. B. Heinemann, 509 S. Wabash Ave., Chicago, Ill.
Institute of Margarin Manufacturers. Sec., Dr. J. S. Abbott, 1212 Munsey Bldg., Washington, D. C.
Institute of Metals. Sec., G. Shaw Scott, 36 Victoria St., Westminster, London, S.W.1, England.
Institute of Mining Engineers. Sec., Charles McDermid, Cleveland House, 225 City Road, London, E.C. 1, England.
Institute of Radio Engineers. Sec., Dr. Alfred N. Goldsmith, College of the City of New York.
Institution of Engineers & Shipbuilders in Scotland. Sec., Edward H. Parker, Elmbank Crescent, Glasgow, Scotland.
Institution of Mining & Metallurgy. Sec., Charles McDermid, Cleveland House, 225 City Road, London, E.C. 1, England.
Institution of Petroleum Technologists. Sec., Commander R. E Stokes-Rees, 5 John St., Adelphi, London, W.C. 2, England.
Instituto Cientifico e Industrial del Salitre. Gen. Sec., Belisario Diaz Ossa, Casilla 2730, Santiago, Chile.
International Acetylene Assn. Sec.-Treas., A. Cressy Morrison, 30 E. 42nd St., New York.
Interstate Cotton Seed Crushers' Assn., Inc. Sec., Robert Gibson, 201 N. Texas Bldg., Dallas, Tex.
Inventors' League of the U. S. Sec., K. Haas, 114 Maiden Lane, New York.
Iron & Steel Institute. 28 Victoria St., London, S.W. 1, England.
Magnesia Assn. of America. Sec., C. J. Stover, 246 N. 17th St., Philadelphia, Pa.
Manufacturing Chemists Assoc. of the U. S. Sec., J. I. Tierney, 538 Woodward Bldg., Washington, D. C.
Manufacturing Perfumers Assn. Sec., C. M. Baker, 305 Broadway, New York.
Metallurgical Society of America. Sec.-Treas., W. Arthur Hall, Pittsburgh, Pa.
Mining & Metallurgical Soc. of Amer. Sec., Donald M. Liddell, 2 Rector St., New York.
Mirror Mfrs. Assn. Sec., H. C. Sorden, Shelbyville, Ind.
National Academy of Sciences. Sec., Paul Brockey, Smithsonian Institution, Washington, D. C.
National Assn. of Cost Accountants. Sec., Stuart C. McLeod, 130 W. 42nd St., New York.
National Assn. of Cotton Mfrs. Sec., Harry C. Meserve, 45 Milk St., Boston, Mass.
National Assn. of Glue & Gelatin Mfrs. Sec., H. B. Sweatt, 81 Fulton St., New York.
National Assn. of Leather Belting Mfrs. Sec., George H. Blake, P. O. Box 859, City Hall Sta., New York.
National Assn. of Mfrs. of Pressed & Blown Glassware. Sec., John Kunzler, House Bldg., Pittsburgh, Pa.
National Assn. of Mfrs. of the U. S. of Amer. Sec., George S. Boudinot, 50 Church St., New York.
National Assn. of Practical Refrigerating Engrs. Sec., E. H. Fox, 914 E. Jackson Blvd., Chicago, Ill.
National Assn. of Purchasing Agents. Sec., H. R. Heydon, 19 Park Place, New York.
National Assn. of Window Glass Mfrs. Sec., J. R. Johnston, Jr., 1701 First National Bank Bldg., Pittsburgh, Pa.
Natl. Bottle Mfrs. Assn. Sec., W. B. Gundling, Wheeling, W. Va.
National Brick Manufacturers' Assn. Sec., Theodore A. Randall, 211 Hudson St., Indianapolis, Ind.
National Canners' Assn. Sec., Frank E. Gorrell, 1739 H Street, N.W., Washington, D. C.
National Coal Assn. Exec. Sec., H. L. Gandy, Commercial Bank Bldg., Washington, D. C.
National Conference of Business Paper Editors. Sec., K. H. Condit, c/o *American Machinist*, 10th Ave. at 36th St., New York.
National Elec. Light Assn. Exec. Mgr., M. H. Aylesworth, 29 W. 39th St., New York.
National Fertilizer Assn. Sec., John D. Toll, c/o *American Fertilizer*, 1010 Arch St., Philadelphia, Pa.
National Fire Protection Assn. Sec., Franklin H. Wentworth, 87 Milk St., Boston, Mass.
National Foreign Trade Council. Sec., O. K. Davis, 1 Hanover Sq., New York.
National Gas Products Assn. Sec., R. L. Carr, 120 Broadway, New York.
National Industrial Conference Board. Comptroller, James M. Robertson, 10 E. 39th St., New York.
National Industrial Council. Chairman, John E. Edgerton, pres. Lebanon Woolen Mills, Nashville, Tenn.
National Institute of Inventors. Sec., R. Nerenstone, 8 E. 14th St., New York.
National Lime Assn., Sec.-Gen. Mgr., William R. Phillips, 918 G St., N.W., Washington, D. C.
National Lumber Manufacturers Assn. of Chicago. Sec., Wilson Compton, International Bldg., Washington, D. C.
National Metal Trades Assn. Pres., William W. Coleman, pres. Bucyrus Co., South Milwaukee, Wis.
National Ornamental Glass Mfrs. Assn. of U. S. & Canada. Sec., Charles C. Jacoby, 2700 St. Vincent St., St. Louis, Mo.
National Paint, Oil & Varnish Assn. Sec., G. V. Horgan, 342 Madison Ave., New York.
National Paving Brick Mfrs. Assn. Sec., Maurice B. Greenough, Engineers Bldg., Cleveland, Ohio.
National Petroleum Assn. Sec., Herbert G. Eaton, 823 Guardian Bldg., Cleveland, Ohio.
National Petroleum Marketers Assn. Pres., L. V. Nicholas, 76 W. Monroe St., Chicago, Ill.
National Pipe & Supplies Assn. Sec., Geo. D. McIlvaine, 908 Oliver Bldg., Pittsburgh, Pa.
National Research Council. Sec., Dr. Vernon Kellogg, 1701 Massachusetts Ave., Washington, D. C.
National Safety Council. Sec., W. H. Cameron, 168 N. Michigan Ave., Chicago, Ill.
National Wood Chemical Assn. Sec.-Treas., F. J. Goodfellow, 76 Main St., Bradford, Pa.
New Jersey Chemical Society. Sec., Frederick D. Crane, 367 High St., Newark, N. J.
New Jersey Clay Workers Assn. & Eastern Section of the American Ceramic Society. Sec., G. H. Brown, Ceramics Dept., Rutgers College, New Brunswick, N. J.
New York Acadamy of Sciences. Sec., Dr. Ralph W. Tower, 77th St. and Central Park West, New York City.
Oil & Colour Chemists' Assn. Sec., H. A. Carwood, 53 Groombridge Rd., London, 9, England.
Plate Glass Mfrs. of Amer. Sec., P. A. Hughes, First National Bank Bldg., Pittsburgh, Pa.
Portland Cement Assn. Sec.-Gen. Mgr., William M. Kinney, 111 W. Washington St., Chicago, Ill.
Refractories Manufacturers Assn. Sec., Frederic W. Donahoe, 840 Oliver Bldg., Pittsburgh, Pa.
Rubber Assn. of America. Pres., Harry T. Dunn, pres. Fisk Rubber Co., Chicopee Falls, Mass.
Rubber Growers' Assn., Inc. 2, 3 and 4 Idol Lane, Eastcheap, London, E.C. 3, England.
Safety Institute of America. Director, Laurence Vail Coleman, 141 E. 29th St., New York.
Salesmen's Assn. of the American Chemical Industry. Sec., George T. Short, c/o Wilckes Martin Wilckes Co., 135 William St., New York.
Sand-Lime Brick Assn. Sec., J. Morley Zander, Saginaw, Mich.
Société de Chimie Industrielle. Sec., Jean Gerard, 49 Rue des Mathurins, Paris, France.
Société d'encouragement pour l'industrie Nationale. 44 rue de Rennes, Paris, France.
Society of Chemical Industry. Sec., J. P. Longstaff, 46 Finsbury Sq., London, E.C. 2, England.
Society of Chemical Industry (N. Y. Section). Sec., Allen Rogers, Pratt Institute, Brooklyn, N. Y.
Society of Dyers & Colourists. Pearl Assurance Bldgs., Market St., Bradford, England.
Society of Glass Technology. Sec., Graves Clark, Darnall Road, Sheffield, England.
Society of Industrial Engrs. Exec. Sec., George C. Dent, 327 S. La Salle St., Chicago, Ill.
Society of Leather Trades Chemists. Sec., W. R. Atkib, University, Leeds, England.
Society of Liquid Fuel Engrs. Sec., Charles F. Reuter, 29 W. 39th St., New York.
Society for the Promotion of Engineering Education. Sec., Dean F. L. Bishop, University of Pittsburgh, Pittsburgh, Pa.
South African Chemical Institute. Sec., James Gray, Box 5254, Johannesburg, So. Africa.
South African Institution of Engrs., Inc. Sec., W. W. R. Jago, Box 4609, Johannesburg, So. Africa.
Steel Barrel Mfrs. Assn. Sec., D. S. Hunter, Cleveland, Ohio.
Steel Treating Research Society. Sec.-Treas., L. S. Carrick, Box 834, Detroit, Michigan.
Synthetic Organic Chem. Mfrs. Assn. of the U. S. Sec., Miss Lois W. Woodford, Room 343, 1 Madison Ave., New York.
Talc & Soapstone Producers Assn. Sec.-Treas., Raymond B. Ladoo, 1448 Girard St., N.W., Washington, D. C.
Tanners' Council. Sec., E. A. Brand, 41 Park Row, New York.
Taylor Society. Managing Director, Harlow S. Pearson, 29 W 39th St., New York.
Technical Assn. of the Pulp & Paper Industry. Sec., W. G. MacNaughton, 18 E. 41st St., New York.
Technical Photographic & Microscopical Soc. Sec.-Treas., Thomas J. Keenan, 514 W. 114th St., New York.
Technical Publicity Assn. Sec., D. Earle Dunn, Room 1210, 11 Broadway, New York.
Textile Alliance. Pres., A. M. Paterson, 45 E. 17th St., New York.
Union Internationale de la Chimie Pure et Appliqué. Sec., Jean Girard, 49 Rue des Mathurins, Paris, France.
United Engineering Society. Sec., Alfred D. Flinn, 29 W. 39th St., New York.
U. S. Potash Producers' Assn. Exec. Sec., Frederick W. Brown, 800 Southern Bldg., Washington, D. C.
U. S. Potters Assn. Sec., Charles F. Goodwin, East Liverpool, Ohio.
Washington Academy of Science. Sec., F. B. Silsby, Bureau of Standards, Washington, D. C.
Western Petroleum Refiners Assn. Sec., John Reynolds, 304 Inter-State Bldg., Kansas City, Mo.

Industrial

Financial, Construction and Manufacturing News

Construction and Operation

California

POTRERO—The Pacific Gas & Electric Co., 445 Sutter St., San Francisco, plans for extensions and improvements in its local artificial gas plant to cost about $100,000, with equipment. Improvements are also contemplated at the Fresno gas works, with new steam compressors and other apparatus.

Delaware

WILMINGTON—The Wilmington Leather Co. has preliminary plans for the construction of a new tanning plant, to replace a works destroyed by fire some months ago. It is purposed to install equipment for an average daily output of 1,000 dozen hides.

Florida

TAMPA — The United States Export Chemical Corp. has been organized with a capital of $2,350,000, to carry out the project for a superphosphate plant in this district, recently announced as an enterprise of Peter S. Gilchrist, president of the Chemical Construction Co., Charlotte, N. C., who will be chairman of the board of directors of the new corporation. The main plant will be constructed in the vicinity of Tampa, and will cost close to $1 000 000 with machinery. Phosphate properties for raw material supply will be developed at Sidney, Dover and Plant City. Lorenzo A. Wilson, Jacksonville, Fla., is president; Harry L. Pierce is vice-president.

Louisiana

MONROE—The Louisiana Glass Mfg. Co. is perfecting plans for the construction of a new local plant to cost approximately $200,000, including equipment. The company was organized recently. John S. Glonnone is secretary and treasurer.

NEW ORLEANS—The United States Paint Co., recently organized to succeed the Atlantic Paint Co., has commenced the erection of a new plant at White and Perdido Sts., for the manufacture of industrial paints, oils, etc. It will cost in excess of $60,000, with machinery. J. Reynaud is head.

Maryland

BALTIMORE—The Porcelain Enamel & Mfg. Co. has filed plans for the erection of a new 1- and 2-story plant, 100x500 ft., at Eastern Ave. and 20th St., to replace a portion of its works at O'Donnell and 8th Sts., destroyed by fire several months ago. R. C. Sandlass is architect.

Michigan

KALAMAZOO—The C. G. Spring Co. has commenced the erection of two new buildings at its plant, each 40x75 ft., to be equipped for enameling service, estimated to cost about $30,000.

New Jersey

GARFIELD—The Meeley Tire & Rubber Co., recently formed under state laws with capital of $1,000,000, has purchased the local plant of the Armstrong Rubber Co., which vacated the property a number of months ago to occupy a new plant at West Haven, Conn. The purchasing company will make improvements and install equipment for the manufacture of tires and other rubber products. G. G. Meeley is president, and P. S. Wighton, vice-president and works manager.

NEWARK—The Ballard Oil Equipment Co., 142 Pearl St., is arranging for the occupancy of the former plant of the Schofield Oil Co., Doremus Ave. and the Passaic River, recently acquired for a consideration stated at $250,000. The plant consists of a number of buildings on a 5¾-acre tract, and will be used for fuel and other oil production and distribution by the new owner; additional equipment will be placed in service. Arthur H. Ballard is president, and A. T. Huntington in charge of development.

New York

RICHMOND—The Atlantic Industrial Alcohol Co. has awarded a contract to the McClintic-Marshall Co., 30 Church St., New York, for the construction of a new plant on the Arthur Kill Rd., 62x80 ft. Plans will be prepared at the office of the contractor.

TUCKAHOE—The Hodgman Rubber Co., 8 West 40th St., New York, has purchased a substantial interest in the Paramount Rubber Consolidated, Inc., Philadelphia, Pa., with plant at Little Falls, N. Y., for the manufacture of hollow rubber products. The Hodgman company will arrange to manufacture such products at its Tuckahoe works, with additional equipment for increased production.

BUFFALO—Randolph Ortman and associates have acquired the plant of the Eastern Oil Refining Co., 111 Howell St., with main refinery at Russel, Pa., at a public auction. The new owners plan to reorganize the property, with improvements in plants for greater production. It is purposed to resume operations at an early date.

MINEVILLE—Witherbee, Sherman & Co., 2 Rector St., New York, have tentative plans under consideration for the construction of a new separator plant at its local iron properties, estimated to cost about $500,000, with machinery. It will replace a works recently destroyed by fire.

North Carolina

DURHAM—The Carolina Power & Light Co., Raleigh, is planning for the installation of a new unit at its local artificial gas plant to cost about $60,000, including equipment.

Ohio

BARBERTON—The Vultex Rubber Co., recently organized to take over and operate the Electric Reclaiming Co., has plans for the erection of a new 2-story addition, 50x60 ft. The company manufactures flat rubber products and purposes to increase the capacity from 12 to 20 tons per day.

AKRON—The Loewenthal Rubber Reclaiming Co., 113 North Broadway, has tentative plans for the rebuilding of the portion of its plant destroyed by fire, June 19, with loss estimated at $50,000.

Pennsylvania

PHILADELPHIA—E. I. du Pont de Nemours & Co. has completed plans for extensions and improvements in its paint manufacturing plant on Grays Ferry Rd., near 35th St., to cost about $25,000.

BATH—The Pennsylvania Cement Co. has commenced the installation of additional equipment at its local mill for considerable increase in capacity.

PHILADELPHIA—Fire, June 20, destroyed a portion of the plant of the Sweepene Mfg. Co., 19th and Clearfield Sts., manufacturer of compounds, etc., with loss reported in excess of $65,000, including equipment. It is planned to rebuild.

OIL CITY—The Penn-American Refining Co. is considering plans for the rebuilding of the portion of its oil refining plant at Rouseville, near Oil City, destroyed by fire, June 21, with loss estimated at $100,000, including equipment.

Tennessee

SWEETWATER—The New Jersey Zinc Co., 160 Front St., New York, has acquired the local plant of the Durex Chemical Co. The new owner plans for the enlargement of the works, with equipment installation for the manufacture of lithophone and kindred products.

Texas

GORDON—The Lone Star Gas Co. has acquired a tract of land in this vicinity and plans for the early construction of a new gasoline-refining plant, to cost about $150,000, including equipment.

EASTLAND—The Arab Gasoline Corp. has received permission to construct and operate a local plant for the production of carbon black, and will commence work at an early date. The company will also build a new casinghead gasoline refining plant on adjoining site, with initial capacity of about 15,000 gal. per day. The entire project is expected to cost approximately $1,000,000, with machinery.

New Companies

SANFORD RUBBER WORKS, INC., Salisbury, Conn.; rubber products; $50,000. Incorporators: J. R. and S. M. Sanford, both of Salisbury.

UNIVERSAL PAPER & SPECIALTY CO., Paterson, N. J.; paper products; $100,000. Incorporators: James F. Brennan and Peter C. Sanford. Representative: William H. Young, 140 Market St., Paterson.

MARDON CHEMICAL CORP., Jersey City, N. J.; chemicals and chemical byproducts; $10,000. Incorporators: T. F. Van Dorn, New York; B. L. Norton, Larchmont, N. Y.; and E. C. Ballantyne, Jersey City. Representative: Capital Trust Co. of Delaware, Dover, Del.

C. H. BECKER PAINT CO., Columbus, Ind.; paints and varnishes; $15,000. Incorporators: Henry H. Vahle and C. H. Becker, both of Columbus.

BAY STATE OIL CORP., Dallas, Tex.; refined petroleum products; $100,000. Incorporators: C. F. Anderson, L. A. Grelling and I. A. Wynn, all of Dallas.

YADKIN CERAMIC CO., New London, N. C.; clay products; $50,000. Incorporators: G. W. and Rufus Isenhour, R.F.D. No. 2, New London; and W. H. Meigs, New London.

PYRAMID TANNING CORP., New York, N. Y.; leather tanning; $30,000. Incorporators: J. Kesper, L. Schrenel and M. Lippman. Representative: J. L. Bernstein, 5 Beekman St., New York.

CRATER OIL CO., 1312 Munsey Bldg., Baltimore, Md.; oil products; $100,000. Incorporators: J. Leiper Winslow, William E. Bonn and James H. Alexander.

CONSOLIDATED CORK CO., Jersey City, N. J.; cork products; $500,000. Incorporators: Thomas F. Farrell, Saul Nemser and I. F. Goldenhorn, 243 Washington St., Jersey City. The last noted is representative.

SEABOARD PORTLAND CEMENT CO., Seattle, Wash.; operate a cement mill; $3,000,000. Incorporators: H. Schroeder and James McDowell, White Bldg., Seattle. The last noted is representative.

SILICA BRICK & PRODUCTS CO., Camden, N. J.; silica products; 10,000 shares of stock, no par value. Incorporators: Edward S. Sharpless, Samuel Bettle, Jr., and S. Rusling Leap, 506 Market St., Camden. The last noted is representative.

INTERNATIONAL LABORATORIES, INC., Wilmington, Del.; chemicals and affiliated products; $125,000. Representative: The Colonial Charter Co., Ford Bldg., Wilmington.

Opportunities in the Foreign Trade

Parties interested in any of the following opportunities may obtain all available information from the Bureau of Foreign and Domestic Commerce at Washington or from any district office of the bureau. The number placed after the opportunity must be given for the purpose of identification.

CAUSTIC SODA. Bremen, Germany. Purchase.—6903.

CHEMICAL PRODUCTS AND OILS. Lausanne, Switzerland. Agency.—6918.

CHEMICAL PRODUCTS, PERFUMERY AND DYES. Buenos Aires, Argentina. Agency. —6939.

CONGO RED, standard quality. Bombay, India. Purchase.—6951.

FERTILIZERS. Koenigsberg, Germany. Purchase and agency.—6969.

MATCHES. Omdurman, Anglo-Egyptian Sudan. Purchase and agency.—6913.

RAPESEED. Koenigsberg, Germany. Purchase and agency.—6969.

MARGARINE, RAW MATERIALS FOR. Bergen, Norway. Agency.—6921.